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Mark Hatfield on Energy and World Peace

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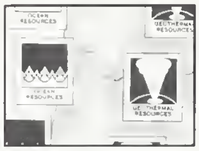

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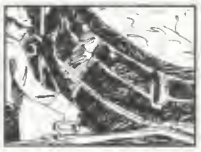

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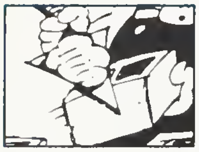

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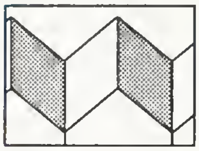

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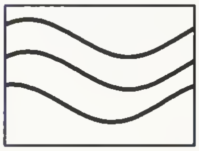

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Editor's Notes

April 22, 1990 marks the twentieth anniversary of Earth Day. In towns and cities around the world, 1970 was the year when varied and sometimes shared environmental crises caught people's attention. Unfortunately, after 20 years, the litany of environmental bad news is still a long one.

But, something happened in the Pacific Northwest midway between then and now. The four Northwest states formed an interstate compact to change the way power planning is conducted in this region and to rebuild the remnant runs of salmon and steelhead on the Columbia River. Now energy efficiency is viewed as the resource of first choice, and thousands of people across the region are working together to protect our fish and wildlife.

Oregon Senator Mark O. Hatfield was a critical player in 1980, when Congress passed the Northwest Power Act, giving impetus to this region's turnaround. He remains an ally today. Energy News is honored that the Senator offered us his observations on the connection between what we do or fail to do and the likelihood of world peace.

This issue's cover illustration is by Lyn Nance.

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Fueling the Future

by Oregon Senator Mark O. Hatfield

The wise use of energy for world peace.

From South Africa to Eastern Europe, the potential for peace in our troubled world seems more promising today than at any time in recent memory. But while current headlines are full of negotiations and troop withdrawals, a story that one day could shatter our fragile peace has been all but ignored.

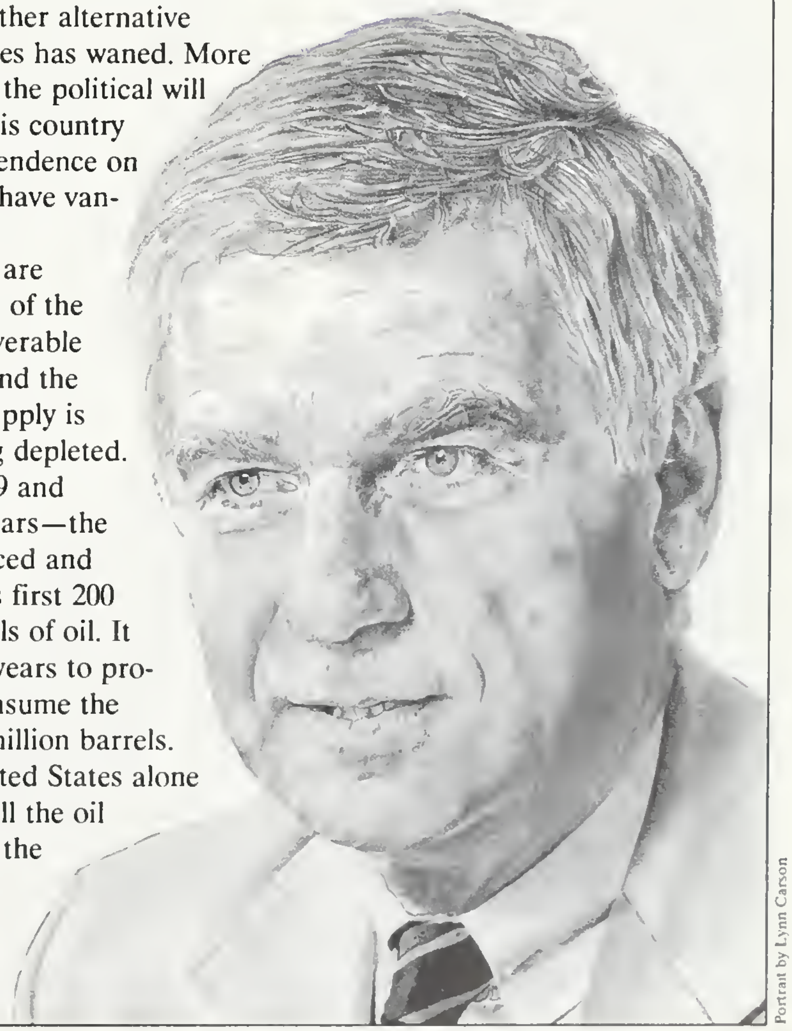
As recently as 1985, the United States imported less than a third of its oil. Today, imports account for almost 50 percent of the oil used in this country, and domestic oil production is at its lowest level since 1963.

A decade ago, as lines grew and prices soared at gas stations across the United States, Americans began to come to grips with the fact that oil is a finite resource. Conservation efforts and the search for other alternative energy sources became top political priorities. The Pacific Northwest led the nation in these endeavors.

But today, despite the fact that oil imports have returned to historic highs and indeed far exceed the level during the first oil embargo in 1973, interest in conservation and other alternative energy sources has waned. More importantly, the political will to remove this country from its dependence on oil seems to have vanished.

The facts are clear: a third of the world's recoverable oil is gone, and the remaining supply is rapidly being depleted. Between 1859 and 1968—109 years—the world produced and consumed its first 200 million barrels of oil. It took just 10 years to produce and consume the second 200 million barrels.

If the United States alone were to use all the oil remaining in the world at its current consumption rates, the



Portrait by Lynn Carson

wells would serve us for another 300 years. Because the United States uses only one–fifth of all world oil, however, those wells could run dry in only 60 years.

Current debates over where and how to drill for oil in this country soon may be rendered irrelevant by a nation desperate to maintain its quality of life and economic productivity. Indeed war over access to the diminishing supply of oil may be inevitable unless the United States and other countries act now to develop alternatives to their dependence on oil. The presence of more than 40 U.S. Navy warships and more than 17,000 U.S. troops in the Persian Gulf several years ago, and the suggestion by two U.S. presidents in the last two decades that nuclear retaliation could be considered an appropriate response to closure of the Gulf, underscore this point.

The obvious question: what are we doing about it? The answer, unfortunately, is not very much.

A decade ago, the federal government's annual budget for the research and development of solar and renewable energy was $770 million. This year, that budget has shrunk to $140 million. Although the administration's recently submitted budget would increase that funding to $175 million next year, the level remains unacceptably low.

Conservation efforts have fared better by comparison. Federal funding for all conservation efforts has gone from $300 million in 1980 to $436 million this year. Unfortunately, however, the administration has proposed spending only $215 million next year.

War over access to oil may be inevitable unless the United States and other countries develop alternatives to their dependence on oil.

Both the government and individual citizens have been lulled by low gas prices into a false sense of complacency. Last year, Americans drove their cars and trucks an estimated 2 trillion miles, 400 million miles more than they did in 1980. After increasing 24 percent between 1976 and 1986, our ability to use energy more efficiently in everything from our cars to our industries has actually begun to decline.

Moreover, we are exporting our dependence: 80 percent of all World Bank funds for electric power generation in developing countries goes toward diesel generators and fuel. Developing countries around the world increasingly are forced to spend vast sums of their precious foreign exchange importing oil.

As efforts undertaken in the midst of the last oil embargo a decade ago suggest, it *is* possible to change course. The development of a national energy policy and a renewed commitment to conservation and the search for other energy alternatives must be made national priorities, sooner rather than later.

Toward that end, the Department of Energy has begun to develop a national energy plan. This initiative was first suggested in an amendment I offered last fall in the Senate Energy Committee. It will involve assessing all of our current and potential energy sources as well as determining the least expensive and most environmentally sound approach to meeting our future energy needs.

The national energy strategy will likely rely heavily on the experiences gained in the Pacific Northwest. The expertise of the Northwest Power Planning Council has been tapped by the Department of Energy as its model for least–cost power planning.

In addition, Congress last fall passed legislation authorizing increased spending for the research and development of renewable energy and energy–efficiency strategies.

Perhaps these and other initiatives will head us in the right direction, but dependence on oil is not exclusively an American problem. Any effective strategy for turning off our current course must also include an international consensus on the issue. As a world scientific leader *and* as an international peacemaker, the United States should work with industrialized and developing nations to create and implement effective and safe energy alternatives.

At the moment, the United States and the rest of the world are running on empty. Unless action is taken now, we all may find ourselves stalling out in the middle of a third world war. ■

Comparing Consequences

by Carlotta Collette

Evaluating environmental effects of electrical resources.

If the first eight decades of this century can be called the "Age of Technology," this last decade is likely to begin the "Age of the Environment." Until recent years, most people figured the earth's ecosystem was too vast, irreducible and ultimately too resilient to be irreversibly harmed by human activities.

The twentieth century witnessed the testing of that theory. By most measures, there were more technological breakthroughs in the past 100 years, or for that matter, in just the past 50 years, than in all the rest of history combined. But that same period also marked the depletion of more essential natural resources, such as fossil fuels, groundwater and topsoil, than ever before. And the residual results of that resource use are only now becoming measurable.

Most remarkable of these environmental aftershocks is the climate change known as "global warming," thought to be brought on by increasing concentrations of carbon dioxide and other gases in the atmosphere. Some scientists point to the fact that six of the hottest 10 years of recorded weather occurred in the 1980s as indication that a climate transition is taking place. They have measured carbon dioxide concentrations in the atmosphere over time and found them to have increased roughly 15 percent in the past 30 years.

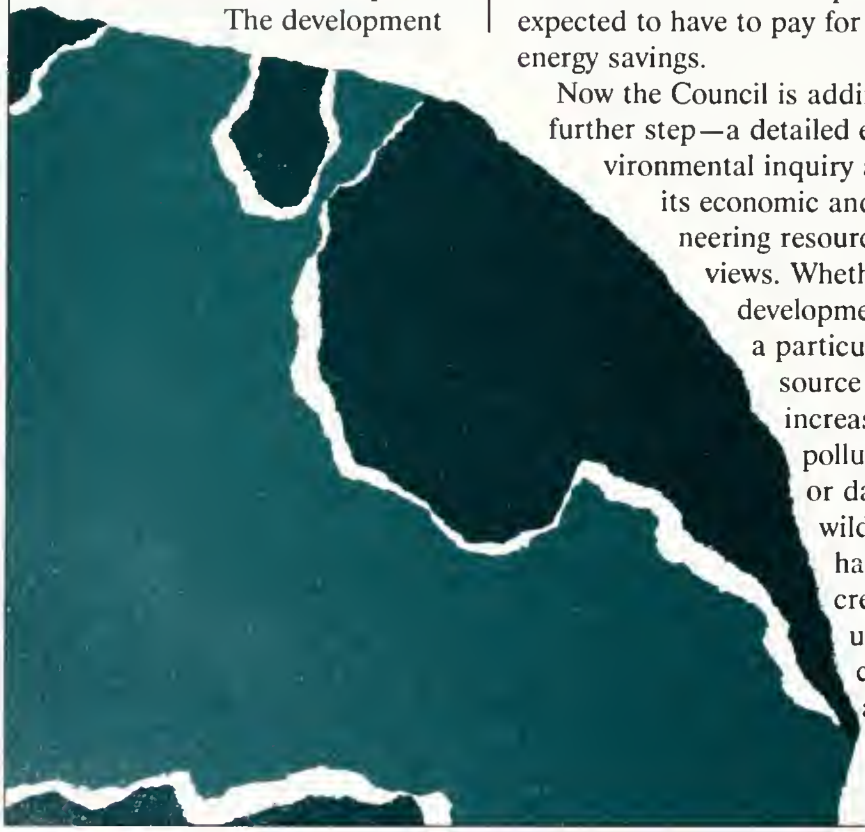
Furthermore, other gas discharges from fuel burning, such as sulfur dioxide and nitrogen oxides, result in near-term environmental problems such as acid rain. Whether this new pollution leads to the significant worldwide changes some

Illustration by Lyn Nance

scientists predict is still a question, but there is clear cause for concern.

As power system planners responsible for meeting the future electric energy needs of the Pacific Northwest, the Northwest Power Planning Council has always reviewed environmental impacts of the resources it studies. But given the likelihood that the U.S. Congress and other regulating bodies will tighten restrictions on power plant discharges—considered a major source of atmospheric pollution—and other ecological effects of power development, the Council, too, is stepping up its examination of these effects.

The Council's resource analysis incorporates both the expected up-front cost of designing, siting and building facilities such as power plants, as well as the more difficult-to-quantify costs of ameliorating or coping with any environmental repercussions from the resource's development. The development costs used in the Council's analysis already include whatever developers will be expected to pay to meet existing environmental regulations. For example, the expected cost of building a nuclear power plant includes the money the developer must set aside to store radioactive waste from the plant and to decommission the plant when it is retired. Coal costs cover the expense of scrubbing coal plant discharges to meet current national and the most stringent state regulations.



However, given national and international concern about atmospheric degradation, the Council has tried to anticipate potential additional expenses. A good example of this is the Council's emphasis on indoor air quality in homes that meet its model conservation building standards for electrically heated homes. The Council went well beyond existing building codes in setting air quality standards for these homes and added these costs to the price it expected to have to pay for the energy savings.

Now the Council is adding a further step—a detailed environmental inquiry after its economic and engineering resource reviews. Whether development of a particular resource would increase air pollution or damage wildlife habitat, create unacceptable noise levels or deplete groundwater, is being explored. The final product will be a more thorough picture of the price society will pay for each resource option. The resources and their near-term and long-term consequences can then be compared fairly. With this analysis, the Council can weigh resource costs and environmental consequences in making judgments about resource cost-effectiveness.

For example, some energy-efficiency improvements that might have been more expensive than the price of power from new coal plants—roughly 10 cents per kilowatt-hour—could still be considered for the resource portfolio. In some cases, resources that cost slightly more than specific other resources might actually be acquired first, because they also have fewer environmental impacts.

Environmental and land-use considerations may even influence the amount of a resource that can be developed. Reliance on resources such as geothermal (using naturally occurring underground hot water to generate electricity), for example, may be limited by the fact that much of the hottest water resides under prized parklands.

By taking a long look at the wake of resource choices, the Council and the region can better ensure that the Northwest's power plan and its electrical future are truly the least-costly options in the broadest sense. ■

Extended RESOURCE Forecasts

Illustration by Lynn Carson

by Carlotta Collette

Some future resources may be as difficult to predict as the weather.

Virtually all planning, by definition, is an exercise in calculated fortune telling. In the Northwest Power Planning Council's power system planning, the horizon now extends a decade into the next century. That's a considerable time frame to predict across with any certainty.

Furthermore, the subject of the planning process is remarkably complex—incorporating expectations about the expansion or decline of an entire region, the development and testing of several technologies, and investments of enormous amounts of money. The risks are great.

Estimates of how much electricity the four Northwest states will need over the next 20 years must be matched with resources that will be economical, reliable and available when they are needed. Then a set of activities must be identified to move the plan into reality.

While there exists a wealth of information regarding currently available resources, speculation must fill the gaps in knowledge about the technologies that may be available down the road. In some cases, the technology has been tested elsewhere, but its adaptability in the Northwest and the amount of it that can be made available still need to be studied. The Action Plan outlines the means to fill in those knowledge gaps.

In past planning efforts, the Council and the region had the luxury of excess power; an electricity surplus that postponed the need to make large capital expenditures for new power plants. But that surplus has all but disappeared. It's decision time in a more critical and potentially more costly sense than the region has had to confront in more than a decade.

How successfully this planning achieves its goal of meeting the electric energy needs of the Northwest at the lowest possible cost depends in large measure on the relative quality of both the known information and of assumptions about the uncertain future. Of particular value in the Northwest's process is the intense public scrutiny that accompanies every step in the planning. By exposing the Council's assumptions to a broad audience, the odds of drawing in the best possible information are increased.

The Council's planning process can be roughly divided into three major areas: 1) determining what future energy needs might be by drawing some conclusions from economic and demographic trends, 2) reviewing all potential sources for that energy, whether they offer new supplies or reduce demand so new supplies are not needed as quickly, and 3) producing the list of actions needed to actually acquire the necessary resources.

Speculation must fill the gaps in knowledge about the technologies that may be available down the road.

To best capture the fullest, if not the most precise, picture of the Northwest in 2010, the Council describes a spectrum of likely growth patterns. Any possible growth or shrinkage in the region's economy (which leads directly to the amount of electricity used) is likely to fall within this range. It spans more than 14,000 megawatts of new energy use on top of current use of about 16,500 megawatts.

Such a broad range encourages regional focus away from the traditional single-point forecast used in the past to drive power plant construction. The Council's reasoning has been that not even the best minds and machines can pin-point the future with enough certainty to gamble millions or, as in the Northwest's recent history, billions of dollars on one estimate.

Nonetheless, resource planners do have to make projections and invest capital on those forecasts. The key to minimizing risk is to start with the least risky resources. At the Council, resource decisions take direction from the Northwest Power Act, which mandates that the Council select the most cost-effective resources first. When several resources have the same costs, the Act gives top billing to conservation, then those resources that are renewable, such as hydropower, wind or solar. The Act calls next for review of generating resources that make use of waste heat (cogeneration) and thermal resources that have high fuel-conversion efficiencies. Only after these have been duly considered, more conventional generating resources such as coal and nuclear plants can be turned to.

The resource list the Council develops is called the resource portfolio, but unlike an investment portfolio, it is not a package of already purchased options. Resources in the Council's portfolio have been selected and ranked based on their known or expected costs, availability, environmental consequences of their development and their compatibility with the existing power system.

But the portfolio is not a "buy list." It was developed using elaborate computer models that compare resource needs, costs and availability illustrating these in charts that are known as "supply curves." The supply curves suggest how much of each resource can be expected at specified costs to best meet the region's electricity needs. But additional resources may appear, or young technologies mature over the coming decades. Some of these could displace resources in the portfolio or cause some of them to shift in emphasis.

Certainly, resources that appear first in the portfolio, such as energy savings, are most likely to be developed first. While those scheduled for after the turn of the century are more vulnerable to being changed or replaced as they become more or less cost-competitive with rapidly maturing technologies.

In addition, each resource category includes a range of costs for that resource. For example, the cheapest category, conservation, includes measures that run from virtually free to those that are on a par with other more expensive resources. Less costly hydropower projects, for example, may be developed ahead of more expensive conservation, assuming they are environmentally acceptable and compatible with the existing power system.

The Action Plan portion of the power plan will lay out interim activities to test and develop resources that are promising, but not yet ready for the portfolio. Resources in the portfolio will serve as cost and compatibility comparisons—benchmarks by which all other resources are measured.

They are the best choices for the money today, and some of them may hold their positions in the foreseeable future. But others may not.

> **By exposing the Council's assumptions to a broad audience, the odds of drawing in the best possible information are increased.**

The whole power plan is meant to be a flexible document, one that can be adapted to changing circumstances. The Action Plan coordinates this ongoing adaptation by integrating research activities with other necessary steps to ensure new resource development. As the need for electricity grows, the Action Plan helps bring about a regional consensus on which resource alternatives to select, and how and when to acquire them.

The Council has made preliminary decisions about some resources it is considering for inclusion in the resource portfolio (see box). The complete list and an Action Plan will be included in the draft power plan, which is scheduled to be released this summer.

Resources Under Consideration

In the next 20 years, if the Pacific Northwest continues to grow at its current pace or better, the region could need as much as 14,000 megawatts more electricity than is currently being used on a guaranteed or firm basis.

Few people expect this level of economic activity to be sustained for that long a stretch, but the Northwest Power Planning Council has to contemplate every probability when it prepares strategies to meet the region's future energy needs. In its current planning process, the Council reviewed the costs and availability of resources that could provide electricity over the next 20 years. For its resource portfolio analysis, the Council has made preliminary decisions to use the following resource amounts to find the best resource mix:

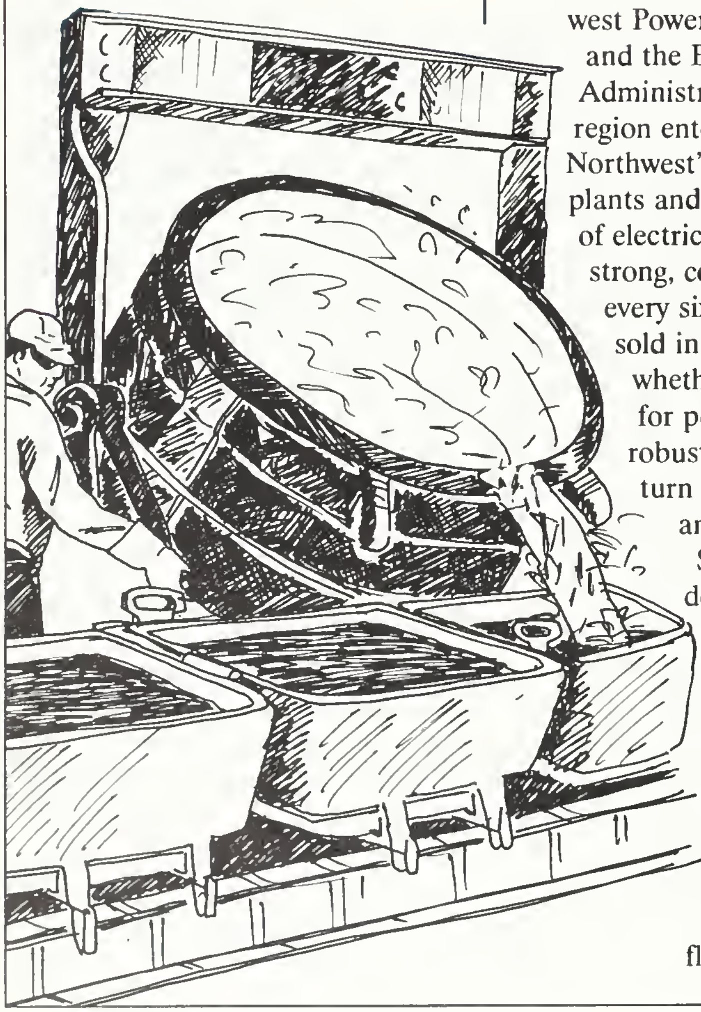
Biomass (wood wastes, other burnable wastes)	**115 megawatts**
Coal plants	**4,800 megawatts**
Cogeneration (using an existing heat process)	**2,200 megawatts**
Conservation	**3,200 megawatts**
Hydropower efficiency (improving existing projects)	**110 megawatts**
Geothermal (using subsoil hot water)	**350 megawatts**
Hydropower	**410 megawatts**
Gas or oil-fired combustion turbines	**2,500 megawatts**
Nuclear	**1,690 megawatts**
Solar	**(quantity not estimated)**
Transmission system improvements	**300 megawatts**
Wind	**400 megawatts**

The Billion-Dollar Question

by Gordon Lee

Energy demand and direct service industries.

It seems paradoxical, but the healthier the Pacific Northwest's aluminum industry gets, the more difficult it becomes to predict how much energy it will use in years to come.



That's the dilemma the Northwest Power Planning Council and the Bonneville Power Administration face as the region enters the 1990s. The Northwest's aluminum plants and other heavy users of electricity are going strong, consuming one of every six kilowatt-hours sold in the region. But whether their demand for power will remain robust well past the turn of the century is an open question. Several billion dollars could turn on the answer to that question.

If the region guesses correctly that large industrial demand will continue to flourish, it likely will build a series of new power projects and conservation efforts to satisfy growing energy needs in the region.

But if it guesses incorrectly and takes steps to meet an expected demand that doesn't materialize, the four Pacific Northwest states could end up with unused or underused new generating facilities, potentially worth several billion dollars. That could mean skyrocketing rates, which would further depress demand, a condition the Northwest experienced in the early 1980s with the ill-fated nuclear plant construction projects of the Washington Public Power Supply System.

Industry representatives are bullish about the long-term fortunes of large industrial power consumers in the Northwest. "There's a high probability we'll be here if the environment is right," says John Carr, executive director of Direct Service Industries Inc., a Portland, Oregon-based trade group representing many of the region's largest industrial customers. "The Council should plan on meeting the industries' current load, plus reasonable growth."

Recent history is no guide. In the late 1970s, when metals prices were high, the Northwest's aluminum industry flourished, and its demand for energy was strong. But by the early 1980s, falling metals prices and rising energy costs squeezed the region's aluminum producers. Plants closed or restricted operations, and the industry's demand for power plummeted. Today, the industry has bounced back, production in the region is close to full capacity, and the industry's demand for energy is near an all-time high.

That cyclical pattern of demand from the region's largest industrial power customers, the direct service industries, is one of the more perplexing forecasting challenges that confront the Council as it begins to write a draft 1990 Power Plan for the region.

Continued or growing demand for energy from these customers could mean the region soon will have to commit to new sources of power. A fall in demand from these customers, or their departure from the Northwest, on the other hand, could postpone the day the region will have to obtain new resources.

"These industries play a crucial part in our long-range planning for the region's power needs," says Tom Trulove, Council chairman. "However, the volatility of their demand for power complicates forecasting. And the longer we look out, the more that volatility becomes an influencing factor."

The Northwest's aluminum plants and other heavy users of electricity are going strong, consuming one of every six kilowatt-hours sold in the region.

Direct service industries pose two separate but related power planning difficulties for Trulove and the rest of the eight-member Council: it's hard to predict swings in direct service industry power use or to predict how long these industries will remain in the region. The first difficulty relates to the industries' fluctuating demands for power, swings that depend on the price of aluminum. Plants that may have a strong demand for power one year may scale back operations the next, in the wake of an aluminum price drop.

The other difficulty relates to the tenuous hold the Northwest has on the aluminum industry. The region's competitive energy costs today mean that plants here may be able to operate long after other plants in the United States might become uneconomic. But that advantage has its limits.

The longevity of the industry in the Northwest depends on world metals prices and on the relative cost of production in the Northwest compared with other locations. Lower energy and labor costs elsewhere in the United States or abroad could attract some, or all, of the region's producers to relocate, with obvious implications for the Northwest's resource needs well into the next century.

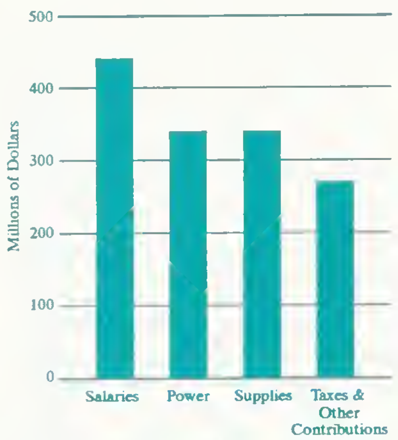
Edward Sheets, executive director of the Council, puts the questions the Council must address in the 1990 plan succinctly. "Should we assume that all the direct service industries in the region will remain over the next 20 years? What probability should the Council attach to all the plants remaining here? And if they remain here, should the Council assume their demand for power will grow or shrink?"

The answers to these questions will become particularly relevant in the mid-1990s. Where for much of the past decade the region produced a comfortable surplus of power, robust economic growth in the past several years has consumed much of that excess. And under the most likely economic growth conditions, that excess could disappear altogether by the middle of this decade.

The direct service industries are a group of 13 industrial customers operating 19 plants in the Northwest that use so much electricity they buy it directly from Bonneville rather than from utilities. Most of the direct service plants are primary aluminum smelters and related aluminum fabricating facilities. The remainder produce other products, including metals and chemicals.

Many of the direct service industries date to the Second World War, and had a special service relationship with Bonneville before Congress passed the Northwest Power Act in 1980. That law continued the special relationship by treating direct service industries as a distinct customer class. These industries over the past 10 years have employed an average of more than 10,000 people annually in the Northwest, bought some $350 million worth of power yearly and paid annual wages in excess of $400 million, according to Direct Service Industries Inc. statistics.

Average 10-Year Direct Service Industries' Contribution to the Northwest Economy (1978–1988)



Source: Direct Service Industries Inc.

Those averages mask wide swings in the industries' consumption of energy, and their place in Bonneville's revenue picture. For example, the aluminum industry alone bought $380 million worth of power from Bonneville in Fiscal Year 1987. A year later, as a result of a spike in demand brought on by rising aluminum prices, the industry's energy purchases jumped to $692 million.

In simple terms, the direct service industries perform a special service for Bonneville. It works this way: in exchange for somewhat lower electricity rates, the industrial customers agree to let part of their service be interrupted when low water levels behind hydropower dams or heavy customer demand squeezes Bonneville's energy supplies. While that interruptibility gives the region's power system more flexibility to meet demand during extraordinary circumstances, it means more uncertainty for direct service industry production schedules.

Bonneville's contracts with these industries allow it to interrupt part of the service to any of them under certain conditions: inadequate spring runoffs, resources fail to come on line or operate as expected, or the stability of the region's electrical system is in jeopardy.

But for resource planning purposes, Bonneville treats three-quarters of the direct service industry load just like it treats customers receiving guaranteed supplies of power, known in industry lingo as firm power. This means that Bonneville's and the Council's plans identify ways the Northwest can meet 75 percent of direct service industry demand with guaranteed supplies of power. The remaining quarter, known in planning jargon as the top quartile, isn't treated as a firm power load in the region's resource planning.

At the end of 1989, according to industry statistics, direct service industries used 3,240 megawatts of firm and nonfirm electricity, equal to about one-sixth of the region's demand of nearly 18,250 megawatts. That's an 85-percent jump from the 1,750 megawatts direct service customers consumed during the 1982–83 recession.

The size of today's direct service industry demand, equal to more power than three cities the size of Seattle would consume, means that a relatively small number of customers play a large role in the Council's calculations of future power needs for the Northwest.

The size of today's direct service industry demand, equal to more power than three cities the size of Seattle would consume, means that a relatively small number of customers play a disproportionately large role in the Council's calculations of future power needs for the Northwest. Moreover, that role could be larger. Their contracts with Bonneville allow these customers to take up to 3,750 megawatts.

The aluminum industry dominates the Northwest's direct service customers. Ten aluminum smelters account for more than 90 percent of the direct service industry's total demand. Those plants account for 40 percent of the United States' primary aluminum production capacity and more than 10 percent of the world's capacity.

Past and current Council forecasts have assumed that if the Northwest experiences high economic growth all those aluminum smelters will remain over the next 20 years. A drop in world aluminum prices, more foreign government subsidies to promote indigenous aluminum industries, or lower demand for aluminum could force the region's producers to shut down operations or move them elsewhere.

In its 1989 Supplement to the 1986 Power Plan, the Council assumed that if the region experiences medium-high growth, 91 percent of current aluminum capacity would remain. In the Council's medium and medium-low forecasts, 82 percent and 66 percent of capacity would operate, respectively. And if the region experiences low economic growth, only half its capacity would operate over the next two decades.

To complicate matters, detailed Council analyses also recognize that the region's economic growth may not go hand-in-hand with the direct service industries' need for power. In certain cases, for example, the direct service industry demand for energy may grow at a high pace, while that of the region as a whole may be at a medium-high or medium-low level. The reverse also could hold true.

All this translates into a range of potential direct service industry demand for electricity. At the high end, the Council predicts that these customers could consume 3,248 megawatts of firm and nonfirm power in 2010, almost unchanged from current consumption levels. At the low end, the region's total direct service customer load could fall to 1,537 megawatts, a 53-percent drop from today.

Direct Service Industry
Forecast of Total Electricity Demand
(Average Megawatts)

	1989 Actual	2010 Forecast
High	3,240	3,248
Medium-high	3,240	2,861
Medium	3,240	2,476
Medium-low	3,240	2,006
Low	3,240	1,537

Source: 1989 Supplement to the 1986 Northwest Power Plan

The most recent data received by the Council staff suggest that demand over the next 20 years may be stronger than previous plans outlined, and that these ranges may need to be raised in the 1990 plan. But even with those revisions, direct service industry demand for energy could remain below today's level in all but the high-growth case.

Representatives of the direct service industries argue that even revised forecasts would be pessimistic, and that the region should plan to meet the direct customers' full load.

"We don't believe the Council should speculate that demand will fall off," says Carr, Direct Service Industries Inc. "It should plan to meet today's load plus reasonable load growth."

Carr points to two factors, put in place in the mid-1980s, that have stabilized direct customer demand for power and revitalized the aluminum industry: Bonneville's variable rates and its conservation/modernization program.

In 1986, Bonneville instituted a variable rate for aluminum direct service customers in response to a recession throughout the industry. The rate pegs the price of power to the price of aluminum on world markets. The higher the price of aluminum, the more the customers have to pay for electricity. Should aluminum prices fall, so too do the companies' power costs. The rate also set ceiling and floor levels, above or below which prices wouldn't go.

Federal energy regulators in 1986 approved the variable rate for seven years. They will have to renew that approval in 1993.

At the same time, Bonneville instituted the conservation/modernization program for aluminum smelters. Through this program, Bonneville pays part of the cost of improving the efficiency of smelters. In return, smelters agree to take less power than their contracts with Bonneville say they're entitled to. This program enables smelters to become more energy-efficient, which means they can stay competitive at lower aluminum prices.

"Once those things went into place, plants were reopened in the region by entrepreneurs," Carr notes. "The solution is working and will continue to work. The appropriate planning assumption is that the companies will be here if the environment is right, that is, if the variable rate stays and if the companies receive adequate power supplies."

The variable rate has been a boon for Bonneville during the past two years, Carr notes. It pumped $500 million more into Bonneville's coffers than the agency expected in 1988 and 1989, when low water and reduced electricity sales to California could have squeezed its income.

However, the direct service industries' contracts with Bonneville expire in 2001. It's anyone's guess whether current arrangements will continue past the turn of the century.

Carr predicts the next contracts will resemble the current ones closely. "I don't know their form, but I'd be surprised if they'd be radically different. The assumption should be that they'll look very similar."

But other observers say the new contracts likely will differ from the ones that direct service customers have operated under since 1981.

"In the short term, for the next decade, the contracts and economic conditions will determine the direct service load," says William Drummond, manager of the Public Power Council, a Portland-based organization representing the Northwest's consumer-owned utilities. "Looking beyond the next contract, that is, beyond 2001, I don't believe you have to assume existing contractual aspects will remain."

The next few years will be crucial. Bonneville intends to place new contract proposals before all its customers, not just direct service industries, by 1995. The shape of those contracts, and the impact direct service energy demand will have on the availability of power for other customers, could have major implications for long-range power planning in the region.

"This issue won't be resolved soon," says Jim Litchfield, director of power planning at the Council. "We need to keep this in mind as we look at power issues in the 1990s." ■

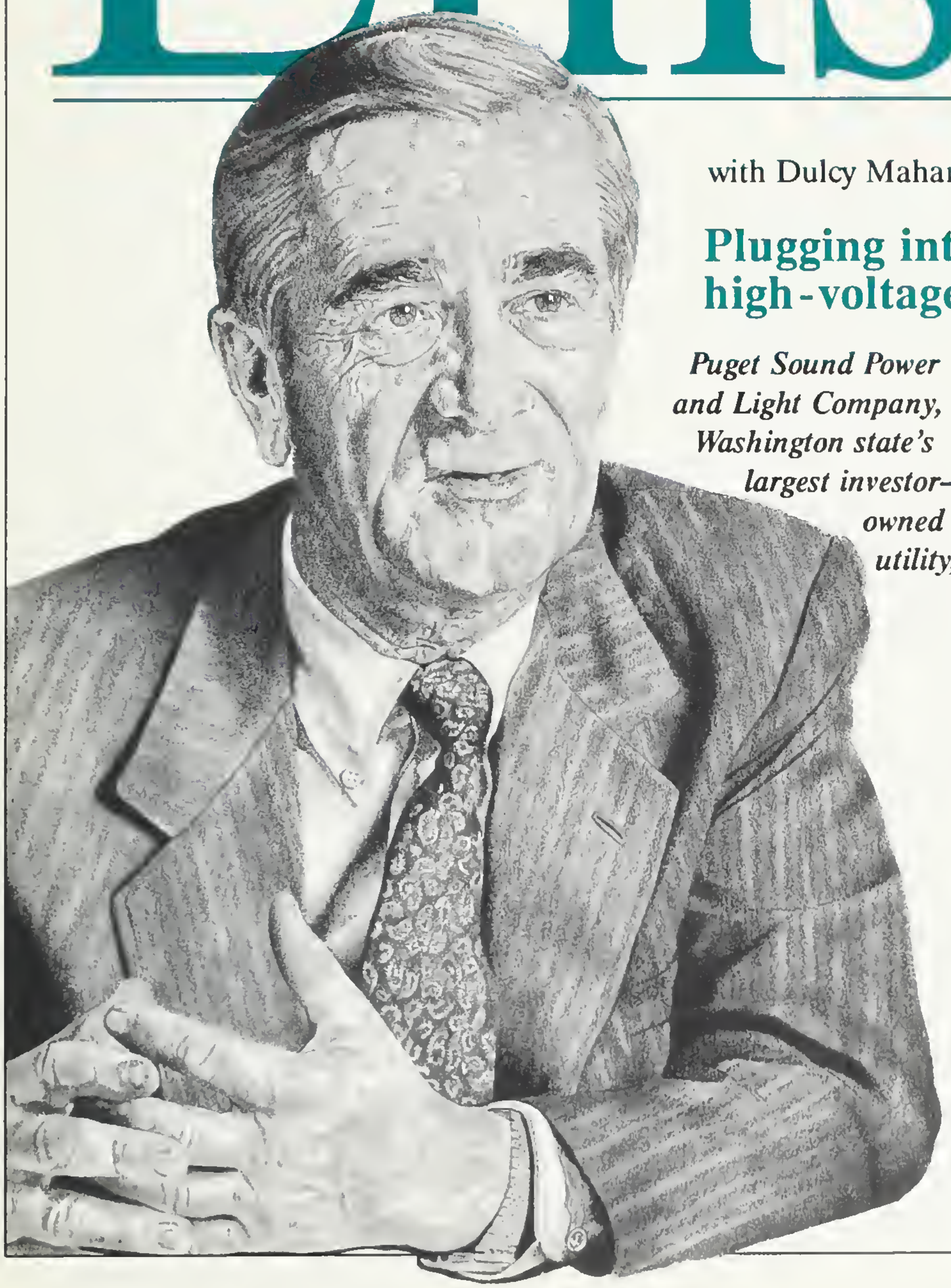
BONNEVILLE POWER ADMINISTRATION'S DIRECT SERVICE INDUSTRIES

	Company Name	Plant Location	Primary Products	Contract Demand (MW)	Electricity Capacity (MW)
Aluminum	Alcoa	Wenatchee, Washington	Primary Aluminum	360	216
	Columbia Aluminum	Goldendale, Washington	Primary Aluminum	296	279
	Columbia Falls Aluminum Company	Columbia Falls, Montana	Primary Aluminum	427	343
	Intalco	Ferndale, Washington	Primary Aluminum	468	459
	Kaiser	Mead, Washington	Primary Aluminum	738	411
	Kaiser	Tacoma, Washington	Primary Aluminum	[1]	149
	Northwest Aluminum	The Dalles, Oregon	Primary Aluminum	174	161
	Reynolds	Troutdale, Oregon	Primary Aluminum	701	253
	Reynolds	Longview, Washington	Primary Aluminum	[2]	419
	Vanalco	Vancouver, Washington	Primary Aluminum	235	230
	Total Aluminum			3,399	2,920
Non-Aluminum	Alcoa, Northwest Alloys	Addy, Washington	Ferro-Silicon and Magnesium	[3]	67
	ACPC	Vancouver, Washington	Aluminum Cable	5	3
	Carborundum	Vancouver, Washington	Silicon Carbide	34	0[4]
	Georgia Pacific	Bellingham, Washington	Chlorine and Caustic Soda	34	34
	Gilmore Steel	Portland, Oregon	Ferro-Alloys and Calcium Carbide	30	0[5]
	Kaiser	Trentwood, Washington	Aluminum Plate	[1]	67
	Nickel Joint Venture	Riddle, Oregon	Ferro-Silicon, Nickel	120	103
	Oremet	Albany, Oregon	Titanium	18	11
	Pacific Carbide	Portland, Oregon	Calcium Carbide	9	0[4]
	Atochem	Portland, Oregon	Chlorine and Caustic Soda	84	78
	Port Townsend Paper Corp.	Port Townsend, Washington	Paper Products	17	13
	Alcoa, Vanexco	Vancouver, Washington	Aluminum Extrusions	[3]	4
	Total Non-Aluminum			351	380
Total [6]				**3,750**	**3,300**

Notes: 1) Included with Kaiser Mead, 2) Included with Reynolds Troutdale, 3) Included with Alcoa Wenatchee, 4) Plant has been dismantled, 5) Currently served by PGE, 6) Contract demands not reduced for expected conservation/modernization program savings.

Point of View

John Ellis



Portrait by Lynn Carson

with Dulcy Mahar

Plugging into Puget Power's high-voltage chief executive.

Puget Sound Power and Light Company, Washington state's largest investor–owned utility, is in a unique position in the Northwest. Its service area, which includes 1.5 million customers in northwestern Washington, happens to be the fastest growing part of the region by a considerable margin.

For Puget Power, there was no electricity surplus in the 1980s. It was, in fact, the only investor–owned utility, other than some short–term purchasers, to buy firm power from the Bonneville Power Administration. Currently, Puget Power depends on others for more than 60 percent of its power.

To meet the rapidly accelerating demands for electricity and stay profitable, Puget Power has had to get out in front of everyone with innovative programs

"Least cost" cannot simply mean the least *dollar* cost of the particular program or resource.

and policies. As a result, it has racked up an impressive list of firsts. Puget Power was the first Northwest utility to develop a least–cost plan. It has spent more than any utility, outside of Bonneville, on conservation programs. It was the first to seek resources through a bidding system, and it is about to embark on another first for the region, conservation transfers.

Puget Power's chairman and chief executive officer, John Ellis, is also in a unique position. Not only is he well respected within the region for aggressive utility leadership, but he is also a national utility industry spokesperson, frequently appearing before Congress and other major forums. This year he is chairman of the Edison Electric Institute, a national organization of investor–owned utilities.

Ellis came to the utility via legal service. As a partner in a law firm, he had served the utility as its chief legal counsel. In 1970, he accepted an offer to join Puget Power as chief operating officer with the provision "that I would never have to practice law again." He became president and chief executive officer in 1976. Three years ago, he was named chairman of the board while retaining his position as chief executive officer.

He is active on a number of industry and civic boards, and has reaped a fair share of honors, including Seattle's First Citizen Award.

By his own definition, Ellis is a "jack of all trades." He plays in a band, flies an airplane, skis, plays tennis and builds boats. "I just love to do everything in the world," he says.

Ellis and his wife, Doris, live in Bellevue, where Puget Power is headquartered. Like his four children, he was born and raised in the Seattle area. His graduate and undergraduate degrees are from the University of Washington.

Q. Yours was the first investor–owned utility in the Northwest to get involved in least–cost planning. Are you far enough along to see some results? How does least–cost planning help you address future uncertainty?

We're now about to go to the [Washington Utilities and Transportation] commission with our second plan, so we've operated long enough under the first plan that we're getting a better feel for how the whole operation works.

In order to come up with a plan that makes sense, you're required to look at your load forecast, your resource plans and how things like conservation may integrate into such plans. You find yourself looking at external factors perhaps in a way you hadn't earlier. I'm referring to such things as the long–range outlook for supply and the price of various fuels, and even such items as potential national policies that may impact air quality or matters of that type.

You can't derive a real least–cost plan without taking all those elements into account. The reason I say that is that least cost cannot simply mean the least *dollar* cost of the particular program or resource. It has to involve all of the various costs and an analysis of all of the risks involved in any particular course of action. This may ultimately lead to a dollar cost that is actually higher than the cost of some other action, but which overall may be the "least cost."

Q. You're talking about accounting for the cost in terms of risk, as well as the actual dollars and cents price tag on the resource.

Exactly, for example, today if you were simply looking at a generating plant, everything else being equal, you would probably select a combustion turbine. It's the easiest to site, cheapest to finance, and, at least today, the fuel supply is the cheapest. But, if you were to analyze that resource against other resources, you would also ask yourself such questions as: how stable is the fuel supply, how stable is the price, can the plant be operated under various air quality classifications, etc., before you could decide what the real cost is.

Another thing that has to be taken into account is that we have a moving target. If I'd had a least-cost plan four years ago, I would probably have had a significant item in deriving load requirements that related to wood stoves. Today I'd have to take that out, because air quality says that resource is no longer available to us when we need it, which is at the peak of our load.

We have the same thing with respect to solid waste power generating. In our last report, we still thought solid waste was a very viable and immediate resource. Now, with the difference in public attitude that's arisen in just two years, it's very doubtful.

So this time in our DARE [Demand and Resource Evaluation] report—which is our least-cost plan—we've attempted to create a number of widely divergent scenarios to apply some of this risk analogy to. These scenarios deal with load growth, economic growth, resource availability, etc. We ask ourselves what would happen if we had high growth, and air pollution restrictions made it impossible to acquire a certain resource?

Unfortunately, the pressure on utilities will be, initially at least, to say least cost simply is whatever will cost the least that particular first year. That's the way it's looked at in a rate case. That pressure may force utilities to make decisions that don't make long-term sense.

Q. Puget Power has been the most aggressive utility in the region in marketing conservation programs. What are your experiences with conservation?

We have been involved in conservation, both peak and energy,[1] since 1970. We became significantly active in the late '70s as a defense mechanism, because our load was growing faster than the resources we planned to build. In fact, in 1980 we perceived we were in such difficult shape that we asked for a moratorium on our obligation to hook up electric heat customers.

So that's the atmosphere that our conservation programs started in. It wasn't one of trying to do something as a public relations message. Our attitude has been; get some cost-effective conservation, so we can keep our load growth within bounds.

Our total investments and expenses for conservation programs exceed $200 million. We were fortunate that, when we went into the conservation investment program, our legislature granted us a 2-percent additional return in equity for conservation investments. We certainly hope that continues, although it's currently at issue.

The thing we've been frustrated about has been the inability to pass sensible conservation codes, so that we wouldn't be out there policing construction. I think the regional Council may have erred a bit in this area with their insistence on very rigid MCS [model conservation] standards. This may have delayed more broad implementation of weatherization codes. I'm not sure the slight difference in effectiveness was worth the delay. But maybe the debate is about over.

Our attitude has been; get some cost–effective conservation so we can keep our load growth within bounds.

All in all, I really have nothing but good to say about conservation.

Q. What, if any, barriers have you run into in implementing conservation, particularly regulatory barriers?

The major regulatory problem we have with conservation, and most people don't understand this, is that as we make conservation investments we don't receive anything to compensate us for even the carrying cost of that investment. This is true between the time we make the investment and the time we have a rate decision. Thus, we may have an investment on our books for several years with no return and no carrying charge attached.

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[1] Peak refers to the highest demand for power during a stated period. Energy here refers to average annual energy generated.

I think it would be most helpful to utilities if we had some current way of collecting a return on conservation investments as they're made, or an updating procedure, rather than having to go from rate case to rate case. I know our commission is looking at some method of doing that now.

We also have recently had a very serious situation where the IRS [Internal Revenue Service] is taking positions on conservation investments that could result in significant tax penalties to utilities offering conservation. One proposal would make some conservation payments received by customers taxable income. I testified on that issue recently before the [U.S.] Department of Energy, asking if they can't do something about it. That's the sort of thing that can turn a program around overnight, just bang, and it shouldn't be happening.

Q. Puget Power is also pioneering in another conservation area, that of conservation transfers—where a utility with surplus electricity sells some of its conservation savings to a utility that needs the power. Yours will be the first such arrangement in the Northwest. What is its status?

I guess the status is that the agreements have been executed. I think everyone involved in it right now is kind of wondering just exactly what it is that they've done. Our problem has been, how in the world do you create a resource that is a firm, long-term resource as far as the acquiring utility is concerned, a resource that it can treat therefore as an addition to its resource stack?

Naturally, the party on the other side wishes only to provide you with that resource for as long as it doesn't need it itself. So that's where the arguments have come. Whether our current formula will work or not is what everybody is waiting to see. The potential is there, no question, but the mechanics are the difficulty.

There again, it's very important that we receive regulatory treatment that recognizes this as an appropriate investment and doesn't defer or delay it in some way.

Q. Puget Power is also the first Northwest utility to use bidding as a way of getting resources. What has your experience been in this area?

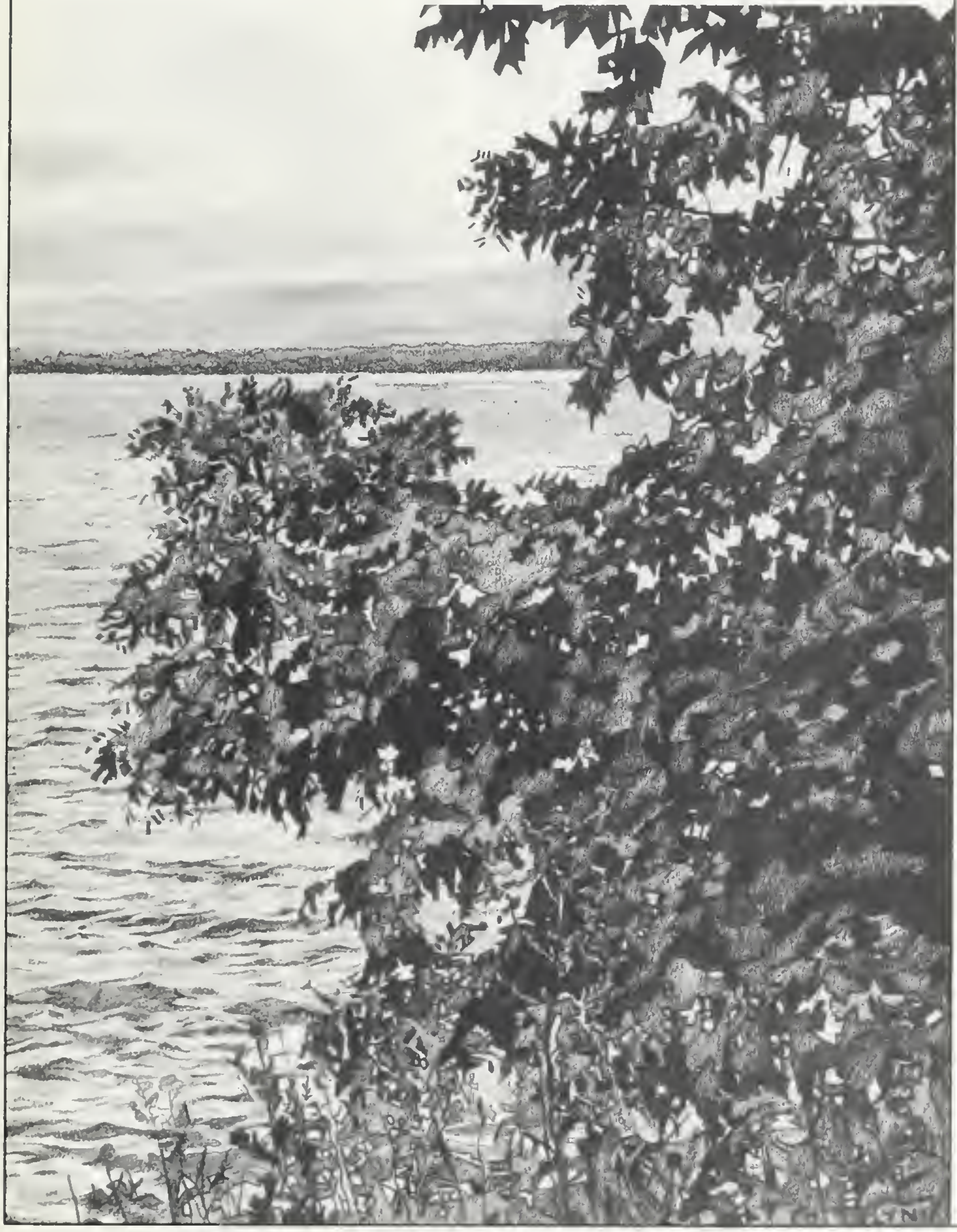
Interestingly enough, the bid [request for proposals] that we put out was a combined demand- and supply-side bid. We asked for a hundred megawatts in resources. We received a great deal more in terms of bids, some 1,200 megawatts, of which at least a third to a half were legitimate resources. We've narrowed those

down now to where we're looking at the most favorable bids at this point.

Most were supply-side bids. The amount on the demand side was relatively small. It's particularly interesting that, on the supply side, most of the top bids we received fall in the cogeneration category.

A disturbing part of the bids was that, on the generating side, most involved projects fueled with natural gas. I have a concern as to just how much gas there's going to be around to burn and what the price will be. I do think that the most legitimate place for gas to be burned, if it does come in short supply, is in a cogenerating plant, where we can achieve both the industrial use and some electricity as well. So I'm pleased to see the cogenerators stepping up here.

Another reason that I was pleased with the process is that most of the supply bids are in our service territory and provide us with generation near load, which is what we so desperately need as transmission problems multiply.



Q. What is the status of your interest in a new power transmission intertie line to BC Hydro, British Columbia's power company, and a third AC intertie line to the Southwest?

I believe that the single most important aspect to a successful future for this company is obtaining transmission access to the north and to the south. By access, I mean access totally under our control and not subject to control by competitors in the marketplace. The reason I say that is that Puget Power is in a sense isolated in that we are here in the northwest corner of the state.

We need to be able to look to markets and supplies in the southwestern part of the United States and to seasonal and other diversities that exist down there. We need to be able to look north to British Columbia for supplies, markets and reservoir storage.

We need to be able to pursue those independently of some other entity's own needs. That's the reason we have been pushing so hard for ownership-equivalent interest in the third AC line south and our BC Hydro interconnection.

The BC thing is well along. It's a relatively short line, only 19 miles long. It has another benefit to our system in that it provides significant system stability in the north end of our system, which we need pretty badly.

The Southwest represents potential additional resources over time. They have large nuclear plants down there that are currently surplus. They are potential markets for those seasons when we have energy to sell, so we can keep our own costs down. It's not simply a matter of an exchange for winter versus summer. It's also that free path, which allows us to get more efficiency out of our system and they theirs.

Q. What do you see as the long-term role for Bonneville? How should it best fit in the regional scheme?

My problem is that I have become darn close to being the old timer in the industry now.

In my earlier days around here, Bonneville's role was to administer the hydro projects on the Columbia River and elsewhere, to supply its requirements preference customers[2] and its industrial customers, and to see to the appropriate distribution of preference power.

Also, kind of through consent of all of us through the years, Bonneville built the regional transmission grid. This was treated in essence as a common carrier for everyone to use, upon payment of a reasonable charge. And then, of course, the intertie was built, and Bonneville was given the authority to sell excess power to California. But at that time, we intended to make it clear by provisions in the law that federal hydropower in the Northwest was to have a regional preference.

In the last few years, as Bonneville has become more marketing oriented, its approach with respect to the use of its transmission facilities and its sale of federal power outside the region has changed significantly.

Its transmission policies now resemble those of a large utility attempting to guarantee its own market, rather than that of a public entity making access available to all. In addition, for economic reasons, Bonneville is frequently engaging in transactions out of the region, which impose additional costs and supply risks on non-preference customers within the region.

I believe that Bonneville's role should be a broad one, but I fear that in their need to look at the bottom line, they have neglected their regional responsibility from time to time. On the plus side, I don't believe Bonneville has ever been better administered.

I believe that Bonneville's role should be a broad one, but I fear that in their need to look at the bottom line, they have neglected their regional responsibility from time to time.

Q. What do you see as the biggest issues before the region?

Well, supply, obviously, and cost right along with it. They're equally dependent on each other. The single big issue is, are we willing to pay the kind of costs that will be necessary to secure a long-term supply, or are we going to take risks in order to achieve lowest-level costs and jeopardize that supply?

I sound like I've been talking only about [supply-side] resources, and I don't intend to. I think there is a yet untapped conservation potential in this region, and we've got to get going on it. But it has to be viewed as something that relates to all fuels and not just electricity.

I don't want to be in the position I was in during the early '80s, where gas supplies were cut off to residential customers because of a lack of supplies in Canada, or in the late '70s, when people were coming to us to throw in an electric furnace, because their oil costs were skyrocketing. I think we need to pursue conservation programs that apply to all sources of energy.

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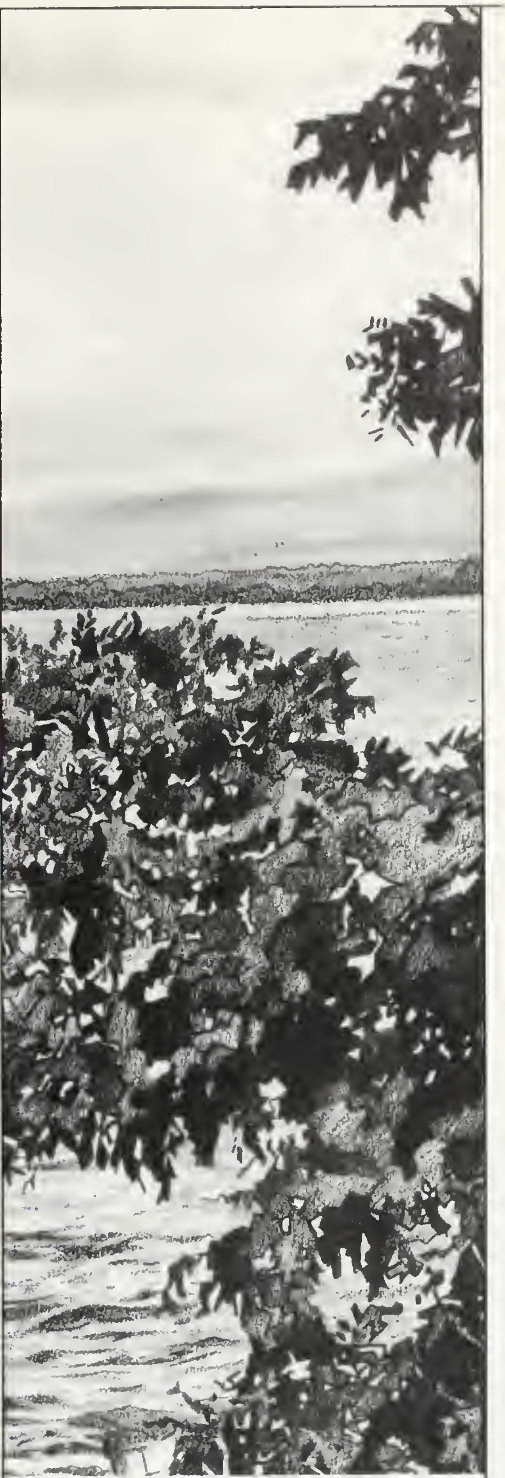
[2] Preference refers to priority access to federal power granted to public bodies and cooperatives. Regional preference would include investor-owned utilities in the region, as well.

This has nothing to do with competition. It has to do with the fact that all energy supplies over time will be tighter, that all will be more expensive. That applies to use for automobiles, houses, industry and everyone else. The only way that's [conservation programs for all fuels] going to happen, is when the consumer sees the real cost of energy. Consumers need to understand that the rates today are perhaps artificially low and may not be adequate in the future.

Q. There is a perception among some people that Bonneville is making near–term rate stability the end–all, at the risk of higher costs in the longer term.

That's exactly what I'm saying. I don't blame them. The political pressure on an agency like Bonneville to maintain rates at the lowest possible level is so great that it forces them to do some of the things I've described. For example, they're attempting to sell power as expensively as possible outside the region and, in the course of that, making it only available to us at that more expensive rate. Remember, we're not a preference customer, so we don't get that same kind of break.

Q. We've talked about Bonneville, but what long–term role do you see the Council having in the region?



I was one of the people who wrote the regional act and who spent the better part of two–and–a–half years lobbying for the creation of the Council. And I've had any number of people who have asked me in the last few years if I had to do it over again would I. I admit that I've had to think pretty hard on it, but the conclusion I've reached is, yes I would.

A regional planning body—a body to *help* the region plan, not to plan for the region, by the way—was a good idea, and it still is. Now, I think they've had it easy so far. They have yet to be involved in the kind of situation we created them to handle, which is a period of continuing need for resources to serve growth and a shortage of resources. They have never had to make a tough balancing decision.

As wild as some of the arguments have been on fish, etc., the fact still is that the Council has been on the side of the gods on that one. They've thrown more cost on electric ratepayers, but without any great objection from that group, and certainly have achieved grand social objectives as a result!

But they've never had a situation of such shortage that they had to balance solving that issue with the issue of supply and the economy and all those other things that we assumed they would be dealing with when we created them. So I say, so far, it's been an easy job; it's been a snap, in fact.

We will find out if the Council really works as we get closer to this shortage time. Then we'll find out if they really provide the forum where all of the public interests can be brought together, and a single course of action can be agreed on, and a regional consensus built upon which action can be pursued. And, we aren't at that point yet, but we're getting very close.

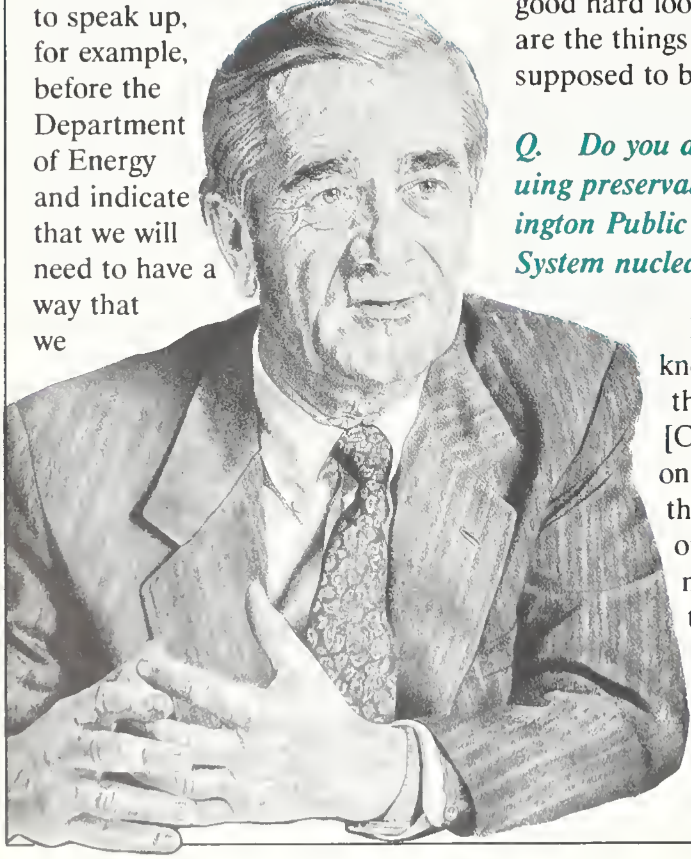
Q. As the Council develops its new power plan, what are some things you want to see come out of that plan?

I'm really scared about this idea of firming up secondary energy[3] with combustion turbines. It sounds great on paper, but it really should be called supplying the next 3,000 megawatts of generation with natural gas. That's basically what you say when you say you'll firm up secondary.

We've just got to look at other alternatives besides that one. Firming nonfirm is an example of the easy out, because it sounds so easy.

Q. What are the alternatives you would look at, assuming that we will need a lot more than conservation in the higher growth scenarios?

I think the Council needs to speak up, for example, before the Department of Energy and indicate that we will need to have a way that we can build coal plants in the region.



We have built coal plants in this region in the last 15 years, all of which are fully scrubbed, all of which are burning low-sulphur coal. In terms of the environment generally, we have nothing at all to be ashamed of. This region needs to make itself heard nationally if we begin to look at restrictions on building appropriate fossil fuel plants because of the quality of performance by others in other parts of the country.

I don't think we should penalize consumers by making it impossible to build an appropriate fossil fuel-fired plant here. I really feel strongly on that issue. We risk the reliability of our system for every year we duck getting on with the question of where are our resources really going to come from. That means looking for sites; that means encouraging clean coal technology; that means, God forbid, getting back with a good hard look at nuclear. Those are the things that planners are supposed to be doing.

Q. Do you advocate the continuing preservation of the Washington Public Power Supply System nuclear projects 1 and 3?

I honestly don't know the answer there. I read a [Council issue] paper on that recently, and there were two pieces out of it that struck me. One is, will the technology be good when we finally decide to get going again? The other had to do with who manufactured the plant and what the operating capacity factors of plants built by various manufacturers were.

I also had the impression that the paper didn't reach any conclusions, and I kind of agreed with the approach. I think it was pretty sensible to say that, obviously, if the plants reach the point where they're technologically no good any more, you've got to get rid of them. And even if today, with its current technology, one probably wouldn't be cost-effective, you might as well not mess with it further. Clearly, some additional tough-minded study should be done before a final decision is made.

I do feel that some time relatively soon we'll see the nuclear technology back in some form or the other. I think, with global climate changes, restrictions on fossil fuel, supply problems with gas and the potential of foreign problems with oil, that we are simply going to have to have some other central station alternative to go with the rest of our menu of resources. But don't ask me to get in front of that one.

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[3] Secondary energy is another name for nonfirm power. Nonfirm power is hydropower that is available above the critical water (historical low) level. Because it depends on the weather, it cannot be guaranteed and thus cannot be sold to meet firm power loads. The Council has been considering proposals to firm up this power by backing it up with gas-fired combustion turbines during those times when secondary power is not available.

Q. I'm not sure that many of our readers know what Edison Electric Institute [EEI] is. What is it, and what are the big issues before it currently?

Edison Electric Institute is the association of all of the investor-owned utilities in the United States. Collectively, they probably supply over 80 percent of the nation's electricity. In general, as chairman, I'm kind of the chief spokesman for the industry on those matters we can agree on.

The top issue before EEI is clean air. I can't tell you what a complicated, enormous issue that is for the country and for utilities. It's clear that the sort of emissions reductions that are being asked for are going to cost a great deal of money. The estimates run from $20 billion to $50 billion or more. The question becomes, who pays those costs? Are they spread generally across the country, or do they apply to those plants that are the offenders?

Perhaps the bigger question is, what will the impact of this law be on the ability to build any kind of fossil fuel-fired plant in the future? I'm not just talking about coal, although it's principally affected. I'm also talking about oil and, to some degree, natural gas.

What the industry is afraid of, costs aside, is that the law could be put in a form where coal-fired generation, at least as we know it now, could simply not be built in some parts of the country. And, strangely enough, it may not be built in those parts of the country where the cleanest coal plants exist today.

The reason for that is that regulation starts with the performance of plants today and assumes you can't get any dirtier than that. So our plants in Montana, which are perhaps the cleanest in the country, start at a level where you can't possibly reduce anything further. If you go East where you're starting at levels that are 10, 20 or 30 times the rate of emissions of our plants, you have a lot of ability to further reduce emissions. The current proposals, in effect, allow you to use these reductions as credits to build other plants.

The second issue in the industry is transmission access. That's a hot issue throughout the country, as transmission becomes more important.

And the third issue is what we call industry structure; some people call it deregulation. It's the growth of a new breed of generating company called an independent power producer, which would be able to sell pretty much free of regulation at market price and not at cost-based rates. That's a major issue.

A regional planning body—a body to *help* the region plan, not to plan for the region—was a good idea, and it still is.

Will the industry be restructured to accommodate those entities, or, in fact, will the industry itself ultimately deregulate at the generating side? Don't expect an answer to that in the next three days. ▪

Laying the Conservation Foundation

by Ruth L. Curtis

Bonneville's resource program starts to build a firm footing.

How solid a building is and how many problems appear over its life depends in many ways on how well its foundation is constructed. In the world of electricity and acquiring new resources, the same principle applies.

The Bonneville Power Administration this winter released a plan for acquiring new electrical power resources for the Northwest. The Draft 1990 Resource Program describes Bonneville's proposed actions to develop conservation and generating resources during the period 1992–1993, plus longer-term conservation efforts through 1997. While the Northwest Power Planning Council is generally in agreement with Bonneville's plan, the Council has expressed some concern about near-term activities that constitute the foundation of the plan.

"We are concerned that more action is needed this year and next, so Bonneville can make the transition to the energy-efficiency and generating resource programs they have proposed for 1992 and 1993," said Council Chairman Tom Trulove.

"There is also a question about whether Bonneville's conservation targets are high enough—especially given the fact that the Bonneville system could need to serve substantial amounts of additional load in the next few years if we continue our current growth rate."

"Conservation is our resource of first choice, but we are not relying on it alone," was Bonneville Power Administrator Jim Jura's comment on his agency's program. "We want a diverse, flexible power portfolio to meet future energy needs without a great deal of financial risk."

Trulove agrees with that. "However, we're concerned that Bonneville is planning to build a major conservation effort, but due to the lack of progress on conservation in the past, the foundation may not be in place for this kind of buildup."

For conservation, the program proposes a 75-percent increase in spending—from $70 million a year in 1991 to some $120 million starting in 1992—to acquire 200 megawatts

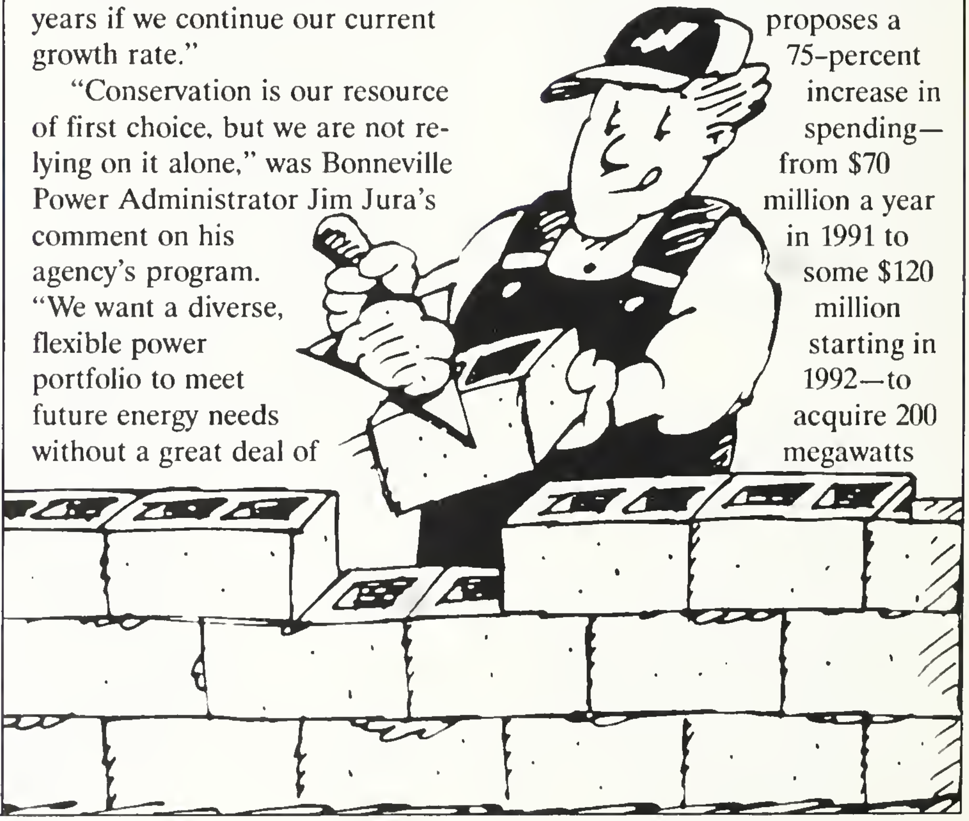


Illustration by Eric Larsen

of efficiency savings between 1992 and 1997. The program also calls for buying power from new generating resources, including a geothermal demonstration project, and making some existing generating plants more efficient. As a contingency plan, Bonneville proposes to take an option on two 420-megawatt combustion turbines that can be fired up when needed to meet peaking energy demand.

As the Northwest's electricity surplus has disappeared, and the specter of a power deficit looms on the horizon, the region is looking intently at new resources to meet growing needs. Conservation—the more efficient use of energy—is considered by the Council and Bonneville to be the most attractive of the possible new resources. It is a large resource, amounting to more than 3,000 megawatts if economic growth is robust, and it costs less than half as much as new generating resources.

Energy efficiency is also a flexible resource; many conservation programs automatically match the growth in energy demand when new buildings are constructed to be energy-efficient. Furthermore, conservation programs can be developed much more quickly than most new power plants, providing that the groundwork of program design and experience is in place before the program needs to be built up.

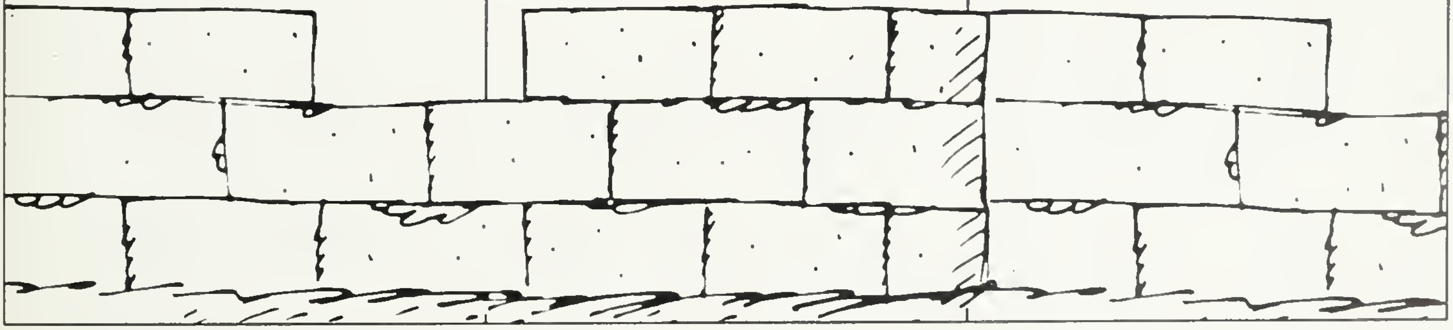
The Council has led this effort with its long-range planning for the Northwest's electricity future. Bonneville has been working to take the Council's 20-year power plan and translate it into near-term action.

During the power surplus, the Council urged Bonneville to establish a solid base of conservation programs to provide a stable transition when the energy is needed. In its 1983 Power Plan, the Council noted that Bonneville and the region's utilities had little experience with conservation programs, except for those dealing with weatherizing existing homes. The Council called for the region to build the capability to acquire all types of energy savings at a pace that would meet the region's future needs. This capability means demonstrating the ability to get a specified amount of energy savings at a set cost within a specific time period. The plan particularly recommended specific programs in the commercial and industrial sectors.

Expanding conservation efforts as soon as possible will also help secure some very cost-effective resources that could be lost to the region forever if they are not captured at the appropriate time. These so-called "lost-opportunity" resources include new office buildings that must be made energy-efficient when they are constructed. Weatherizing these structures later is expensive and can never achieve the same level of efficiency.

> **"There is a question about whether Bonneville's conservation targets are high enough."**
>
> ***—Tom Trulove***

A year ago, the Council assessed Bonneville's conservation efforts. From 1981 through 1987, Bonneville became a regional and national leader in implementing energy-efficiency programs. The agency invested nearly $685 million in all its conservation efforts. Of this, $248 million was spent on building the capability to acquire conservation, and $437 million went toward actually acquiring 185 megawatts of conservation savings. These savings cost 1.4 cents per kilowatt-hour—a real bargain compared to 10 to 12 cents per



> **"Conservation is our resource of first choice, but we are not relying on it alone."**
>
> ***—Jim Jura***

kilowatt-hour electricity from new generating plants.

While Bonneville achieved a number of milestones with conservation, much more needs to be done. The good news is that the region has extended its proficiency in reducing energy waste in existing homes through weatherization and in new homes by encouraging energy-efficient building techniques.

The bad news is that progress in the commercial and industrial sectors has been much slower. The Northwest still does not know how to design region-wide programs to capture the sizeable energy savings in these sectors. Furthermore, cost and savings data, and a trained labor force are still not available.

The Council has regularly asked Bonneville to expand its efforts in the conservation arena. And it has not been alone. In July, when reviewing Bonneville's budget, the U.S. Senate Committee on Appropriations stated:

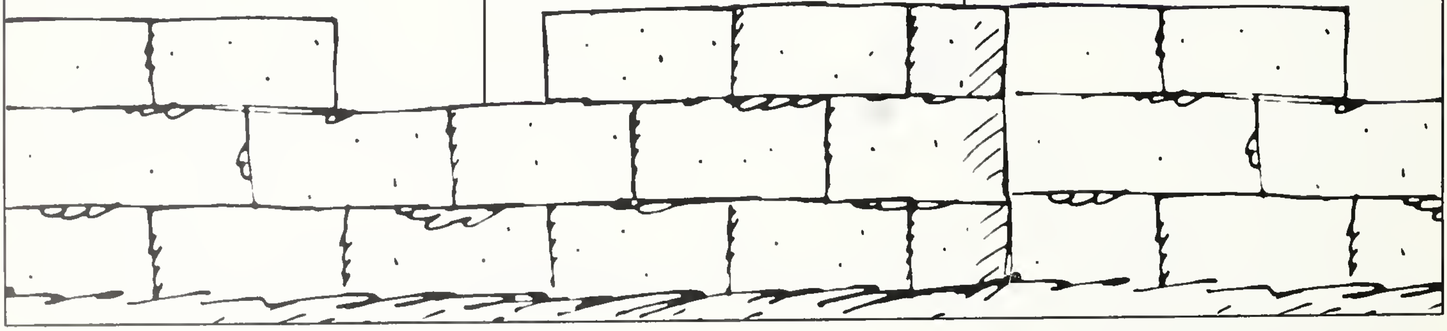
> *Given the declining surplus of electricity in the Northwest, the Committee is concerned that several objectives in the least-cost plan have not yet been achieved. BPA [Bonneville] shall continue its efforts to increase staff and other support in Fiscal Years 1990 and 1991 for lost-opportunity conservation programs, including pilot programs in the commercial and industrial sectors. The objective of these efforts should be to gain sufficient experience and capability so that in Fiscal Year 1992 BPA is able to operate programs designed to capture all cost-effective lost opportunities in its customers' service territories.*

That same month, the heads of Seattle City Light, Tacoma City Light and the Eugene Water and Electric Board wrote Jura to say that they were "vitally interested in the direction of Bonneville Power Administration resource acquisition programs over the next one to two years... given the diminishing size of the surplus, we think now is the time to revisit appropriate levels of BPA conservation funding."

"The first increment [of new resources] should come from continued pursuit of residential conservation while the infrastructure for such programs remains intact," the three utilities wrote. "In the commercial sector... funding levels need to be increased and new programs initiated if we are to move smoothly toward optimal resource acquisition. In the industrial area, only two programs... have been undertaken—an insufficient level of activity to make long-term program decisions."

Trulove, speaking for the Council, concurred with the comments of the three public utilities. "The time is approaching in the Northwest when we will need new sources of electricity. What we do now will determine how cheaply we can acquire those new resources."

Bonneville's draft program was released in December for public comment. The final version is expected in July 1990.



mcs update

by Judi Hertz

Evergreen State marches ahead on model conservation standards.

Washington Governor Booth Gardner is flanked by that state's Power Council members, Tom Trulove (left, Council chair) and Ted Bottiger, after signing into law the new statewide energy code.

Photo by Jim Erickson, Washington State Energy Office

"The Washington state legislature has blazed a trail for the rest of the states in the region." That's how Tom Trulove, chairman of the Northwest Power Planning Council, characterized the January passage through both state chambers of a law adopting model conservation standards for new residential construction in Washington.

The standards, sometimes referred to as the Northwest Energy Code, were developed by the Council to save electricity in new electrically heated homes and other buildings in the region. The key features of the bill include a building code equivalent to the Council's standards with some minor alterations and a code for non-electric homes that is identical to that in a bill the legislature considered last year. This year's bill also retains the former bill's requirements for indoor air quality in electrically heated homes.

Passage of the statewide energy code, which takes effect July 1991, coincided with a celebration marking the 50th city or county in Washington to adopt the code locally. Since 1984, when the city of Tacoma, Washington, became the first jurisdiction to make the model conservation standards part of its building code, over 70 other cities and counties in Idaho, Washington and Montana have adopted these standards. The state of Oregon amends its statewide building code every three years and is considering the Northwest Energy Code for 1992.

"We salute the farsighted leadership of local governments who have been adopting the model conservation standards since 1984," Trulove noted. "The sum of all their adoptions totals close to 70 percent of all new electrically heated housing starts in Washington."

Through September 30, 1989, 6,343 multifamily units and 3,029 single-family homes had been built to the standards. This construction amounts to approximately $20 million in energy savings (money the Bonneville Power Administration would have spent acquiring electricity) and results in approximately 2.3 megawatts saved for the region. These numbers include some savings in megawatts and dollars accrued as a result of improved building codes, as well as savings from homes built through utility-sponsored efficient-home marketing programs such as Super Good Cents and Comfort Plus.

The following are the jurisdictions adopting the Northwest Energy Code and the date of adoption.

NORTHWEST ENERGY CODE ADOPTERS

(Cities/Counties Adopting as of February 20, 1990)

WASHINGTON

Blaine	1988
Bremerton	1989
Brier	1989
Cathlamet	1987
Cheney	1986
Columbia County	1986
Cusick	1988
Elma	1985
Ephrata	1989
Everett	1989
Ferry County	1989
Fife	1986
Fircrest	1986
Franklin County	1989
Grand Coulee	1987
Granite Falls	1990
Ione	1988
Kennewick	1990
King County	1989
Kitsap County	1989
Lacey	1990
Lincoln County	1989
Mason County PUD #3 (utility)	1989
McCleary	1984
Metaline Falls	1988
Milton	1986
Monroe	1990

WASHINGTON (cont.)

Newport	1988
Okanogan	1989
Omak	1990
Pateros	1989
Pend Oreille County	1987
Port Angeles	1990
Port Orchard	1989
Pullman	1987
Quincy	1989
Republic	1985
Royal City	1989
Snohomish	1989
Snohomish County	1989
Soap Lake	1989
Spokane	1987
Spokane County	1987
Stanwood	1984
Sultan	1989
Tacoma	1983
Tonasket	1989
Twisp	1989
Warden	1989
Winthrop	1989
Yakima Indian Nation	1989

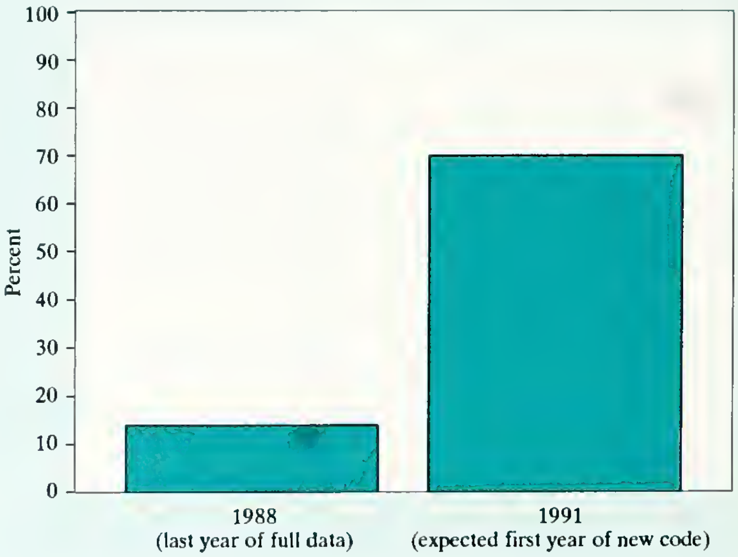
MONTANA

City of Missoula	1988

IDAHO

Albion	1987
Ammon	1987
Bingham County	1987
Blackfoot	1987
Bonners Ferry	1987
Bonneville County	1986
Burley	1987
Declo	1987
Franklin	1987
Harrison	1989
Heyburn	1987
Idaho Falls	1986
Iona	1986
Kootenai County	1989
Latah County	1990
Minidoka	1987
Minidoka County	1987
Moscow	1988
Nampa	1990
Nez Perce Tribe	1989
Orofino	1988
Rupert	1988
Shelley	1987
Soda Springs	1989
Ucon	1987

Regional Impact of Washington's New Statewide Energy Code on Percent of Electrically Heated Homes Being Built to the Full Model Conservation Standards.



FISH BYPASS FUNDS BEGIN TO FLOW

Then Vice-President George Bush on a 1988 Oregon fishing trip.

Photo courtesy of The (Portland) Oregonian

by Steve Crow

Protection for young salmon and steelhead gains White House support.

For the first time in recent history, a president's budget request to Congress includes support for a major program of repairs to mainstem Columbia River dams. These repairs will save millions of young fish attempting to migrate downstream. The bypass channels and screens covered by the $15-million appropriation will divert the tiny migrants from deadly turbines at four federally owned dams.

President George Bush put the bypass money in his administration's 1991 budget at the urging of a coalition of regional and congressional representatives. Key Northwest Senators—Mark Hatfield and Bob Packwood of Oregon, and Jim McClure of Idaho—worked closely with administration budget officials for months to develop the budget proposal.

The safe-passage improvements had been the consensus position of a broad spectrum of Northwesterners representing utilities, fish and wildlife agencies, Indian tribes, the Bonneville Power Administration and the Northwest Power Planning Council. They were called for in the Council's Columbia River Basin Fish and Wildlife Program in 1982, and reaffirmed in subsequent years. The fish and wildlife program uses wholesale power revenues from Bonneville to finance habitat repair, new hatcheries and other enhancement activities in the Columbia Basin.

Bypass improvements were seen as a critical piece of the integrated effort to recover some of the salmon runs lost to the region because of the development of the river for hydroelectricity. Bypass channels and screens can cut in half the number of fish annually slaughtered by turbines during their trip down the Columbia to the ocean. Without the facilities, millions of fish produced at ratepayers' expense to reseed waters above the dams would be lost.

Concurrence among regional power and fish entities led in 1987 to an expedited schedule to complete the changes by 1994. But this schedule was predicated on funds being made available in the federal budgets for the U.S. Army Corps of Engineers to construct the facilities.

Unfortunately, the Corps never requested adequate funds to continue the bypass program. While there was support for funding from the regional Corps' office, any progress was wiped out by officials in Washington, D.C., as annual budget proposals advanced through the bureaucracy. In Fiscal Years 1988, 1989 and 1990, the final Corps' budget requests, in effect, proposed to terminate the fish bypass program.

In 1988, after Congress intervened and added funds for the bypass program, the Corps even refused to spend the funds allocated by Congress. This delay, along with other factors, caused about a three-year slippage in the completion date of 1994 and increased total costs of the program. In response to the Corps' resistance and delays, Congress specifically directed the agency in appropriations legislation to spend the funds as allocated by the legislature.

Bypass channels and screens can cut in half the number of fish annually slaughtered by turbines.

Since then, Congress, at the request of the Northwest, approved and directed spending of $28.2 million for new and improved bypass facilities at six mainstem dams. These funds paid for new barges, designed to collect and transport fish from upriver to below the dams; fish loading and holding facilities; development and testing of longer turbine screens; and for the start of construction on a new bypass system at Lower Monumental Dam, which has no fish bypass facilities.

Congress also provided funds for the design and development of new bypass facilities at Ice Harbor Dam and The Dalles Dam. Nevertheless, Corps budget officials in Washington, D.C., continued to express reservations about requesting federal funds in the future for bypass facilities, especially for Ice Harbor and The Dalles.

Tom Trulove, the Council's chairman, led this year's effort to include the funds in the presidential budget and is complimentary about the shift in policy. "This represents a dramatic change in the priorities of the federal budget. It marks a significant change, not just in tone, but in policy. It reverses the approach taken over the last five years by the previous administration to effectively terminate the bypass program. More than any other factor, this strong, consistent support of the entire congressional delegation, led by House Speaker Tom Foley and Senator Mark Hatfield, laid a foundation for approval of the 1991 budget item."

The 1991 budget request to Congress represents enhanced support for the fisheries resources in the Pacific Northwest. But all the news isn't good.

The 1991 budget still does not include adequate funds for bypass facilities at two projects the Corps opposes—Ice Harbor and The Dalles. Instead, the Corps proposed another costly study for these projects. Of the two dams, Ice Harbor is ready for final design and construction without further delay. On the other hand, The Dalles requires continued funding for design and testing of screens and bypass facilities. This budget falls short of addressing those two dams.

Nevertheless, the new White House policy on fish bypass funding, reflected in the 1991 budget request to Congress, is a major step forward in the region's efforts to rebuild the salmon and steelhead runs in the Columbia River Basin. ▪

Budget bashes Bonneville again!

Every year since the beginning of the Reagan administration, the president's budget proposal has called for faster repayment of the Bonneville Power Administration debt to the federal Treasury. 1990 is no exception. President George Bush reiterated the notion that Bonneville and four other federal power-marketing agencies should repay what they owe the U.S. Treasury at accelerated rates. All the money the agencies spent before 1974 to build such things as dams and transmission systems would have to be repaid on a revised schedule and at floating interest rates rather than at the fixed interest rates they currently pay.

If the president has his way, Bonneville's $653 million 1991 repayment would be increased by $590 million. Wholesale power rates in the Northwest would have to be increased substantially to cover the payment hike.

Bush's budget also proposes a limit on Bonneville's ability to borrow money for conservation programs and transmission equipment. The Northwest Power Act mandated that conservation be treated the same as any other power resource.

"When Bonneville wishes to acquire energy savings, it should be able to finance those purchases by borrowing the money and paying it off over time with interest, the way any utility would finance the construction of a new power plant," argues Ed Sheets, executive director of the Northwest Power Planning Council. "Instead, this budget proposes to change the rules and take away important tools the region has to meet its energy needs." This switch in policy comes at a time when the region's energy needs are growing, and new resources will be needed. "Conservation is our best resource buy," notes Sheets. "We shouldn't be penalized for trying to acquire energy savings."

If the budget proposal passes, conservation expenditures will be billed against each year's revenues. Today's electricity consumers will pay for energy-efficiency programs out of today's rates, even though the energy savings will benefit ratepayers for 15 or 20 years.

—CC

SHORTS

Atmospheric scientists have confirmed a vital part of the theory that man-made gases contribute to global warming through the greenhouse effect.

According to research conducted at the University of Chicago, water vapor in the atmosphere can amplify the warming effect of carbon dioxide and other gases. That amplification is crucial to the greenhouse theory, which postulates that those gases trap heat in the atmosphere. Without the amplification, future global warming would be negligible, scientists say.

The study, which measured temperature and radiation from satellites, buoys and ships at sea, concluded that amplification takes place and that it is of about the same magnitude as predicted by mathematical models on which forecasts of global warming largely are based. [Source: *The New York Times*, 12/14/89.]

A new wind turbine blade is under development that could cut the cost of wind-generated electricity by as much as 38 percent.

The Solar Energy Research Institute reports that a new wind turbine blade could slash the cost of wind-generated electricity to between 7 cents and 10 cents a kilowatt-hour. Currently, the cost of wind-generated electricity ranges between 10 cents and 15 cents a kilowatt-hour, according to Northwest Power Planning Council estimates. The new turbine blade is undergoing testing on a wind farm near Palm Springs, California, a place whose turbulent winds have damaged blades routinely. [Source: *DOE This Month* (U.S. Department of Energy), 11/89.]

Model conservation standards may become the norm at new federal housing projects, under amendments to a bill sponsored in the Senate by Alan Cranston of California. The amendments, offered by Senator Tim Wirth of Colorado, would create a task force at the Department of Housing and Urban Development to draft energy-efficiency standards modeled after energy-saving housing features adopted in the Northwest for new housing built by the federal government. [Source: *Clearing Up*, 12/8/89.]

British Columbia has decided to reclaim 600 megawatts of power it has sold to utilities on the U.S. side of the border for the past two decades. BC Hydro, the province's utility, will begin to take back that power, equal to the amount of energy consumed by a city the size of Portland, Oregon, in 1998. The entire Canadian share could be reclaimed by 2003. However, the utility noted that it was open to negotiations about future power sales that could benefit the two countries.

The Canadians can reclaim that power under terms of a treaty between the United States and Canada signed in the mid-1960s. The agreement allowed the Canadians and the United States to share equally in the hydropower produced in U.S. power houses from water stored in three Canadian dams on the Columbia River. [Source: *Seattle* (Washington) *Post-Intelligencer*, 12/14/89.]

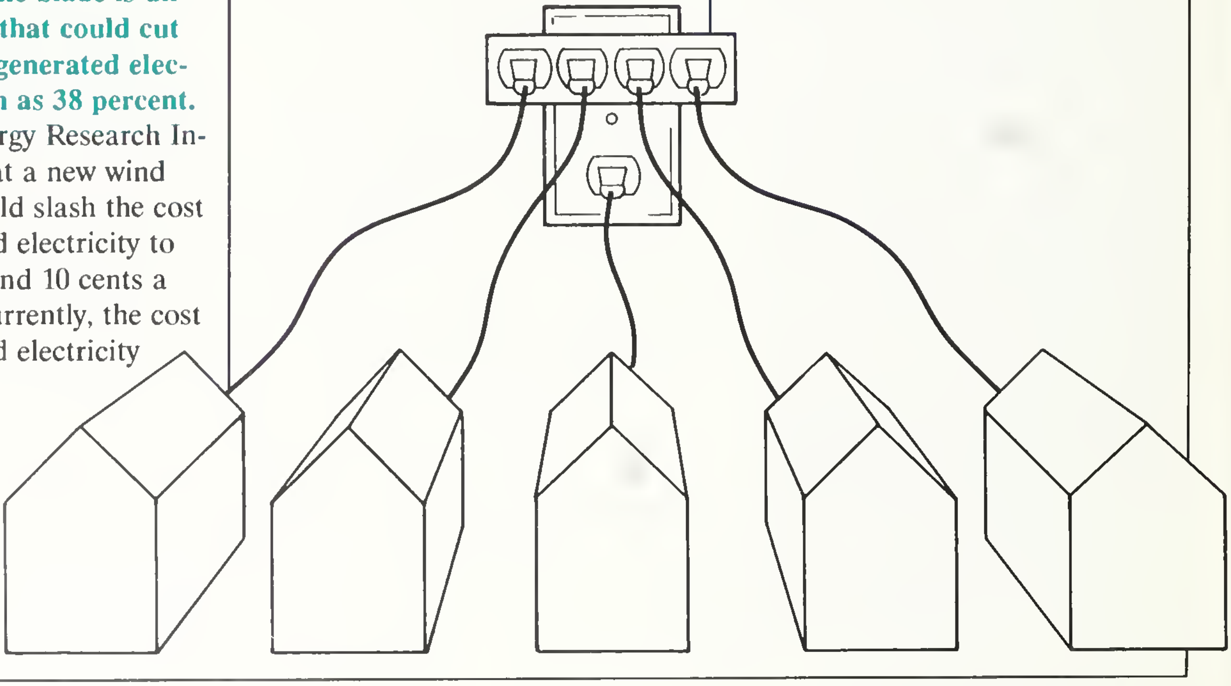


Illustration by Lynn Carson

SHORTS

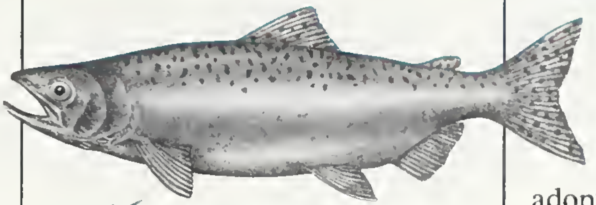
Researchers have announced they've successfully crossbred chinook and chum salmon. Professors Gary Thorgaard of Washington State University and James Seeb of Southern Illinois University said they have created a hybrid "chumook" salmon, mating chum females with chinook males.

The hybrid can adapt to saltwater at an early age, like its chum mother, but its meat resembles its chinook father. If replicated commercially, this combination could boost the yield from salmon net pens, the researchers said. [Source: *The* (Vancouver, Washington) *Columbian*, 11/16/89.]

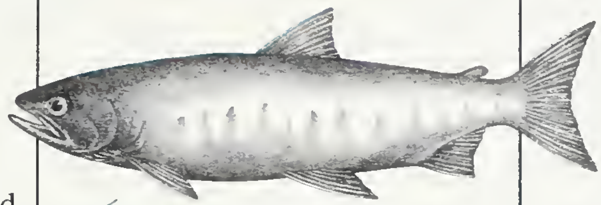
Pacificorp, the Portland, Oregon–based parent of Pacific Power & Light Company, has been named 1989 utility of the year by *Electric Light and Power* magazine. It also was named the "utility to watch" in the 1990s by *Forbes* magazine.

The diversified utility holding company, which took over Utah Power & Light Company last year, received the award for its entrepreneurial spirit, marketing and financial innovations, *Electric Light and Power* said.

In its annual report on American industry, *Forbes* chose Pacificorp as the U.S. utility best positioned for success this decade, citing the Portland company's ability to compete in increasingly volatile markets and its successful diversification moves. [Sources: *Electric Power and Light*, 11/89; *Forbes*, 1/8/90.]



Chinook



Chum

A solar water heater designed by a Eugene, Oregon, company recently was named one of last year's 100 best new products by *Popular Science* magazine.

The magazine cited a passive solar water heater made by Sage Advance Corp. as one of 1989's best new products. The magazine said the water heater's innovative design—which eliminates exposed plumbing, electric motors, pumps and electronics—overcomes many problems common to water heaters in the past. The system heats water using gas bubbles to push liquids warmed by rooftop solar panels through a closed loop of pipes that leads into the water heater. [Source: *Popular Science*, 1/90.]

Oregon has adopted a new wild fish policy aimed at conserving and enhancing populations of native salmon, steelhead and trout. The new policy, adopted earlier this year by the Oregon Fish and Wildlife Commission, for the first time gives the state direction in managing natural fish populations, not just stocks bred in hatcheries. The policy will help the Oregon Department of Fish and Wildlife assess the size and location of wild fish populations in the state and identify which are most in need of help. [Source: Oregon Trout Inc., 1/90.]

The U.S. Department of Energy plans to spend $336 million on energy efficiency and renewable energy initiatives, including $35 million in the current fiscal year. Through the year 2000, savings from those initiatives—which include putting in super–efficient lights at federal facilities, toughening lighting standards for commercial buildings and designing new regulatory practices that encourage utilities to invest in conservation measures—could exceed $32 billion. On the other hand, the department has proposed to cut conservation programs run by state energy offices by $187 million. The administration is requesting only $30 million next year, financed from oil overcharge revenues. [Source: U.S. Department of Energy, 1/90.]

—Compiled by Gordon Lee

Illustration by Joan Barbour

CALENDAR

March 5–9 – Short Course on Cogeneration Technology in Madison, Wisconsin. Sponsored by the University of Wisconsin. For more information: Charles E. Dorgan, Department of Engineering Professional Development, University of Wisconsin at Madison, 432 N. Lake Street, Madison, Wisconsin 53706.

March 6–8 – "Affordable Comfort IV: Meeting Energy Challenges of the Nineties" conference in Philadelphia, Pennsylvania. Sponsored by the Energy Coordinating Agency of Philadelphia, the Pennsylvania Energy Office, the Bonneville Power Administration, Portland Energy Conservation Inc. and others. For more information: Affordable Comfort Conference, Energy Coordinating Agency of Philadelphia, 1501 Cherry Street, Philadelphia, Pennsylvania 19102, 215–854–8030.

March 14–15 – Northwest Power Planning Council meeting at the Edgewater Village Red Lion in Missoula, Montana.

March 19–22 – "Solar '90" in Austin, Texas, including both the Annual Conference of the American Solar Energy Society and the 15th National Passive Solar Conference and held simultaneously with SOLTECH 90, an industrial exhibition. For more information: American Solar Energy Society, 2400 Central Avenue, Suite B–1, Boulder, Colorado 80301, 303–443–3130.

April 1–4 – International Solar Energy Conference in Miami, Florida. Sponsored by the American Society of Mechanical Engineers. For more information: Jeff Leanard, American Society of Mechanical Engineers, 345 E. 47th Street, New York, New York 10017, 212–705–7740.

April 4–6 – "Eighth Annual International Energy Efficient Building Conference and Exposition" in Denver, Colorado. Organized by the Energy Efficient Building Association. Sponsored by the Western Area Power Administration, the Solar Energy Research Institute, the Colorado Office of Energy Conservation and others. For more information: Energy Efficient Building Association, Technology Center, University of Southern Maine, Gorham, Maine 04038, 207–780–5143.

April 11–12 – Northwest Power Planning Council meeting at the Eugene Hilton in Eugene, Oregon.

April 23–27 – "Energy and Environment '90" held in Joenkoeping, Sweden. Sponsored by the International Water Supply Association and the International Association on Water Pollution Control. Contact Elmia Energy and Environment, Box 6066, S–55006, Joenkoeping, Sweden (56 36 11 9060).

May 9–10 – Northwest Power Planning Council meeting at the Shilo Inn in Idaho Falls, Idaho.

June 13–14 – Northwest Power Planning Council meeting in Spokane, Washington.

July 11–12 – Northwest Power Planning Council meeting at the Outlaw Inn in Kalispell, Montana.

CALENDAR

July 29–August 3 – "Indoor Air '90: The Fifth International Conference on Indoor Air Quality and Climate" in Toronto, Canada. Sponsored by the Building Owners and Managers Association International, the Center for Indoor Air Research, U.S. Department of Energy and others. For more information: Indoor Air '90, c/o Canada Mortgage and Housing Corporation, 682 Montreal Road, Ottawa, Ontario, Canada K1A 0P7, 613–748–2714 or 748–2715.

August 26–September 1 – "1990 Summer Study on Energy Efficiency in Buildings" at the Asilomar Conference Center in Pacific Grove, California. Sponsored by the American Council for an Energy–Efficient Economy. For more information: Lawrence Berkeley Laboratory, ACEEE 1990 Summer Study Office, Building 90H, Berkeley, California 94720, 415–486–7478.

September 23–28 – "World Renewable Energy Conference" in Reading, United Kingdom. Sponsored by the University of Reading. For more information: Professor A.A.M. Sayigh, Congress Chairman, Department of Engineering, University of Reading, Whiteknights, P.O. Box 225, Reading Berkshire, RG6 2AY, UK.

A more detailed calendar of Council committee meetings and consultations is carried each month in *Update!* See order form on back cover.

—Compiled by Ruth L. Curtis

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The Northwest Power Planning Council is required to develop a program to restore the Columbia fisheries and a regional electric energy plan emphasizing cost-effective conservation and renewable resources

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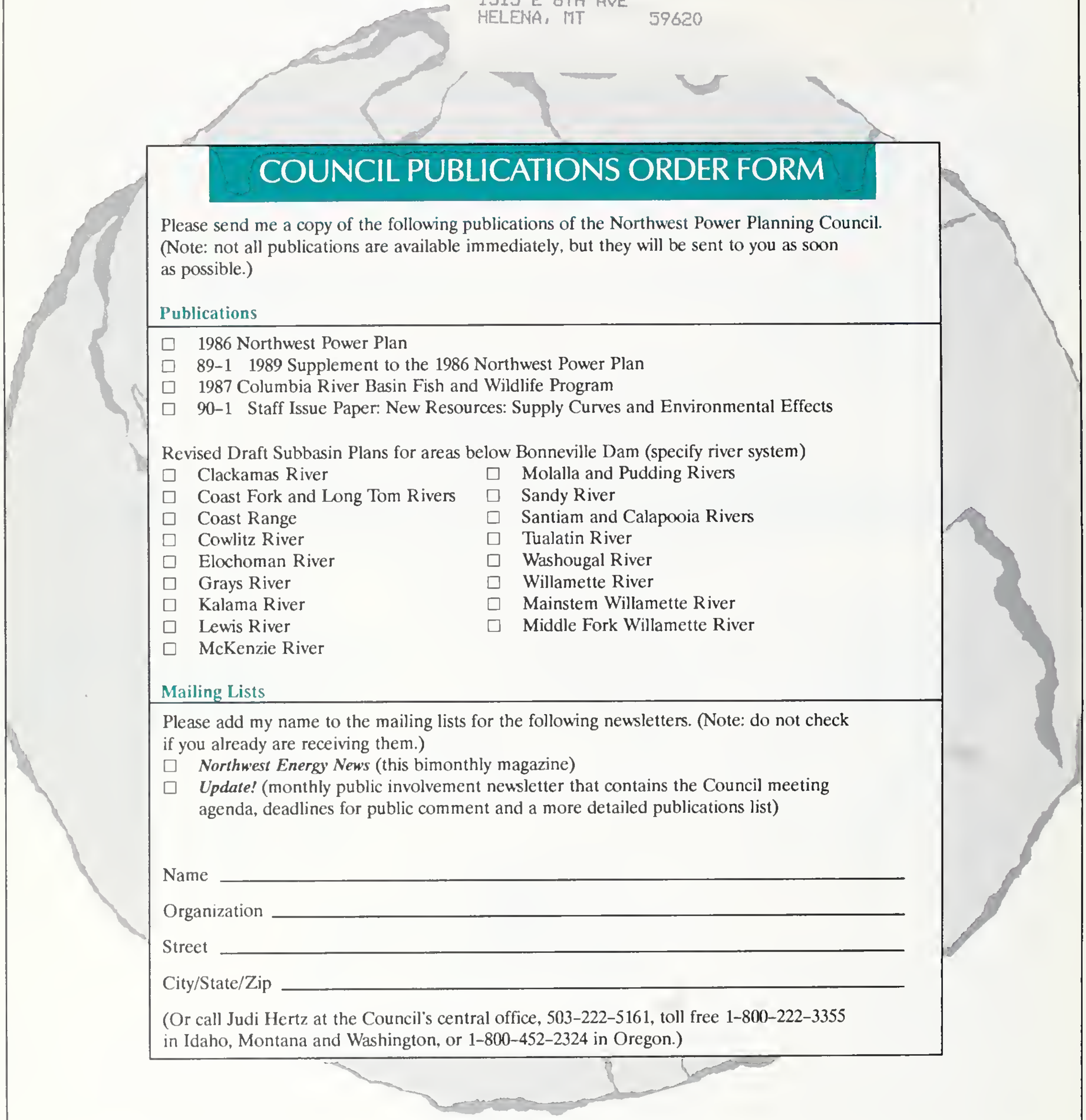

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- ☐ 1986 Northwest Power Plan
- ☐ 89-1 1989 Supplement to the 1986 Northwest Power Plan
- ☐ 1987 Columbia River Basin Fish and Wildlife Program
- ☐ 90-1 Staff Issue Paper: New Resources: Supply Curves and Environmental Effects

Revised Draft Subbasin Plans for areas below Bonneville Dam (specify river system)

- ☐ Clackamas River
- ☐ Coast Fork and Long Tom Rivers
- ☐ Coast Range
- ☐ Cowlitz River
- ☐ Elochoman River
- ☐ Grays River
- ☐ Kalama River
- ☐ Lewis River
- ☐ McKenzie River
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- ☐ Sandy River
- ☐ Santiam and Calapooia Rivers
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- ☐ Willamette River
- ☐ Mainstem Willamette River
- ☐ Middle Fork Willamette River

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- ☐ *Northwest Energy News* (this bimonthly magazine)
- ☐ *Update!* (monthly public involvement newsletter that contains the Council meeting agenda, deadlines for public comment and a more detailed publications list)

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Conservation: The new utility challenge

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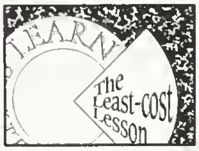
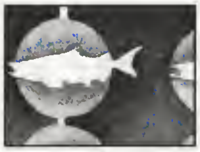


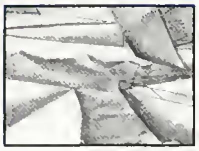
15 Utilities Learn the Least-cost Lesson

The conclusion's the same; conservation is the region's most practical resource.



21 Columbia River Census

Salmon and steelhead counts rise and fall like the tide.



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Editor's Notes

As we go to press, a petition to list Snake River sockeye under the Endangered Species Act is being reviewed by the National Marine Fisheries Service. These are the red fish for which Redfish Lake in Idaho was named. They used to turn the whole lake crimson with their shimmering presence. Last year, only two of them made their way back up to spawn. There could be a few more coming in this year, but the run has looked bad for some time now. If this or any Columbia River stock is listed, the ramifications will be immense. We begin to cover this issue on page 6.

This issue's cover illustration is by Jud Guitteau.

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Illustration by Thomas Hardy

POWER PARADOX IN THE PACIFIC NORTHWEST

by Gordon Lee

Slower growing energy demand may mean a faster growing resource base.

Over the next two decades, the Pacific Northwest under certain robust economic conditions may need to tap into more amounts of new power each year than ever before, even as its appetite for electricity grows more slowly than in most of the post–World War II years.

That paradox lies at the heart of a revised interim forecast of regional power demand under development by the Northwest Power Planning Council and the Bonneville Power Administration. Their forecast suggests that energy consumption in the next 20 years may grow more slowly than in most years since 1945. But despite that predicted slackening of consumption growth, the region may need more power added to its resource base each year in the next two decades than at any other time, including the boom decades of the 1960s and 1970s, if it experiences high economic growth.

"Because our economic base is so much larger today, a smaller rate of energy demand growth still may translate into larger annual climbs in absolute demand than in the past," notes Tom Trulove, Council chairman. "Utilities soon may have to commit to new sources of power to meet the region's demand for energy."

This is the second year in a row that the Council and Bonneville have worked on a joint forecast. This year's updated figures aren't radically different from last year's.

The region should see a marked decline in its energy demand growth rate in the next 20 years. Its appetite for electricity likely will grow between 0.6 percent and 1.8 percent a year, in the medium-low to medium-high growth range. If demand grows at a high level, the Northwest's demand for electricity could climb 2.7 percent annually. That compares with yearly growth rates of 7 percent in the 1950s and 1960s, 4 percent in the 1970s and 1 percent in the volatile 1980s, a decade in which demand was relatively stagnant until 1986, after which it grew at a 4-percent annual pace.

Those forecast growth rates translate into a range of potential energy demand for the region. Customers in the Northwest could demand 29,500 megawatts by the year 2010, if high energy demand growth continues. That would be a 75-percent jump from the 16,621 megawatts the region consumed in 1988. Medium-low to medium-high economic growth during that period—which is more likely—would translate into a 2,400-megawatt to 7,800-megawatt increase in regional demand, compared with 1988.

Energy consumption in the next 20 years may grow more slowly than in most years since 1945.

Put in different terms, the region's energy demand would grow by an average of nearly 650 megawatts a year in the next 20 years, in the high-growth case. In contrast, the Northwest added an average of 406 megawatts a year during the fast-growing 1950s and 1960s—when regional demand grew at three times the rate of the forecast's high-growth scenario.

However, those demand forecasts don't equal the amount of power the region will need to produce under various growth scenarios. That's due to a phenomenon known as transmission line loss. Because of the laws of physics, more than 7 percent of the electricity sent on power lines in the Northwest disappears during transmission. This means that to guarantee they'll meet projected demand, producers must boost the amount of power they generate by the amount they expect will be lost during transmission.

In the high-growth case, for example, the region must produce 31,650 megawatts in order to guarantee delivery of 29,500 megawatts, Council and Bonneville analysts calculate. The four Northwest states will have to produce 26,100 megawatts and 20,400 megawatts to guarantee they will meet demand in medium-high and medium-low conditions, respectively.

The region's existing resource base will be able to handle only a portion of that load. Without adding any new resources, Bonneville and utilities will be able to guarantee some 18,350 megawatts to Pacific Northwest customers in 2010, according to utility figures. This means that in the high-growth case, the region will have to obtain some 13,300 megawatts of new power to meet expected demand. In the more likely medium-high to medium-low growth range, the region would have to obtain between 7,750 megawatts and 2,050 megawatts of new energy.

Economists expect that the slowdown in the Pacific Northwest's electricity demand growth rate will come as its economy continues to shift away from basic manufacturing, toward commercial activities. On average, the commercial sector uses 1 megawatt of electricity per 1,000 employees, compared with 12 megawatts in the manufacturing sector. By 2010, some 82 percent of the region's total employment will be in the commercial sector, up from 73 percent in 1988, according to the revised forecast.

Even with this commercial growth, the region's active economy of the late 1980s and early 1990s is expected to slow. That spells lower rates of energy demand growth. Basic demographic trends indicate that the rate of economic growth in the next two decades—measured by employment, population, households and production—will be lower than in the past. National forecasts expect employment to grow at half the rate in the next 20 years as in the 1960–1980 period, and regional trends point in the same direction.

In addition, conservation and more efficient new buildings will require less energy than older structures. Washington recently adopted a statewide building code that requires new homes be built with super energy-efficient features. Twenty-six cities or counties in Idaho and Montana have embraced similar measures, and Oregon is considering adopting similar measures for its statewide code in 1992. Today's new buildings use about 30 percent less energy than existing structures, and by 2010 nearly half the region's building stock will have been built since 1984.

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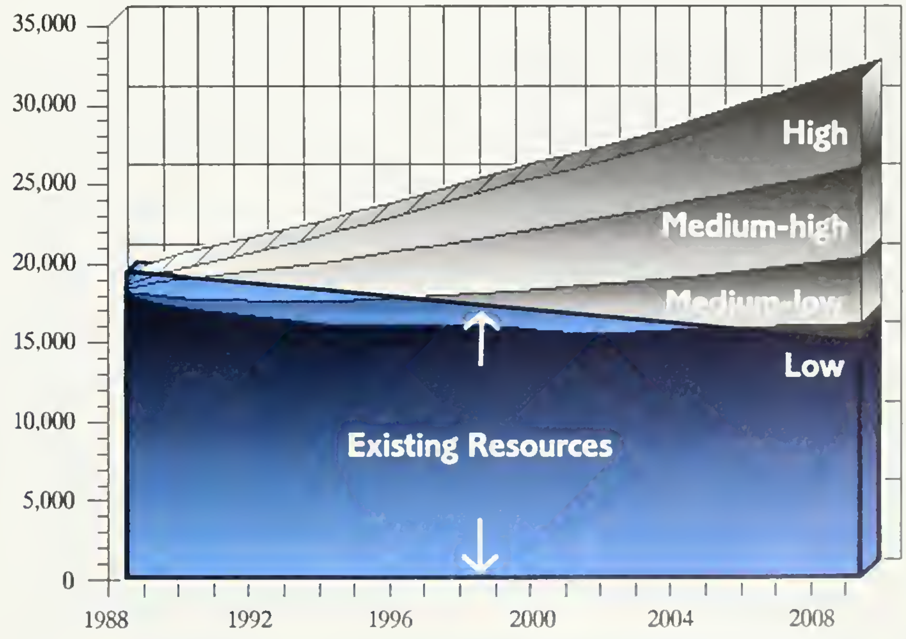
Demand also will slow as a result of competition from natural gas, whose relatively low price will continue to make it an attractive heating alternative to electricity. Moreover, power use by the region's traditional heavy users of electricity—the paper, wood products, aluminum, chemicals and food products industries—also isn't expected to grow as much as in previous years. Those industries account for more than 90 percent of the region's industrial use of electricity, and each experienced significant increases in energy demand during the 1960s and 1970s. None is projected to grow at that pace in the next 20 years.

Terry Morlan, the Council's demand forecasting manager, notes that growth rates need to be interpreted with caution. For power planning purposes, the implications of slower or faster rates of growth hinge on the size of underlying regional demand. Growth was much faster in the 1950s and 1960s than Morlan expects it to be in the next 20 years. But because the economy was smaller, the amount of resources the region added each year was relatively modest, compared with the latest projections of potential resource needs in certain high-growth economic circumstances. ■

Regional Power Predicament

Existing resources may not meet forecast needs (average megawatts)



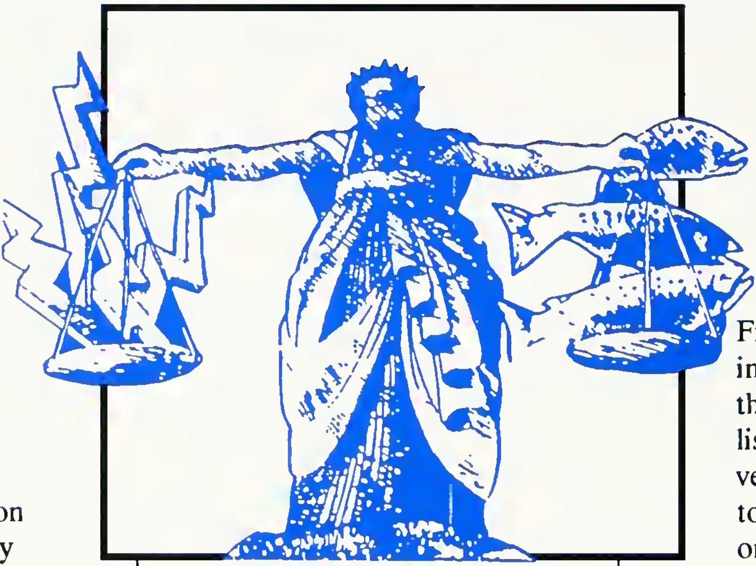
Source for existing resource base: Pacific Northwest Utilities Conference Committee Northwest Regional Forecast, March 1990

Chart by Stephen Sasser and Judy Gibson

The Law of *Last Resort*

by Carlotta Collette

Are the Columbia River's salmon endangered species?



In February, Oregon Trout, an advocacy group that supports protection for the region's wild fish populations, notified the National Marine Fisheries Service that it is "beginning the petitioning process under the federal Endangered Species Act for Snake River chinook salmon and lower Columbia River coho salmon."

On March 22, the Shoshone-Bannock Tribes of Idaho petitioned the federal government to list the Snake River race of sockeye as endangered. The sockeye are one of two Snake River runs (sockeye and coho) that many experts suspect have already gone extinct. These runs caught the attention of the National Marine Fisheries Service and others late in 1989. While many experts believe it is too late to salvage them, other experts extend the hope that extraordinary action could save these fish.

The runs identified in the Oregon Trout announcement (Snake River spring, summer and fall chinook and lower river wild coho) have been seriously depleted, but rigorous protection may stop their decline. The federal fisheries agency has stepped up its review of these stocks.

The National Marine Fisheries Service is the lead federal agency charged with reviewing and enforcing petitions to list ocean-migrating fish under this legislation. The Act, which was adopted in 1973, is designed to pull species back from the brink of extinction.

Fish or wildlife considered to be extremely vulnerable can be listed as "endangered" or "threatened," calling into play some of the most rigorous protective measures permitted under federal law. Listing a species as threatened would require development of a recovery plan, consultation with the Fisheries Service regarding federal agency actions that may jeopardize a listed species, and the development of alternatives to avoid adverse impacts on the species.

A listing as endangered could stop virtually all development or activity that might harm that species. For example, the Endangered Species Act states that it is unlawful for any person to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct" affecting an endangered species.

When a petition to list a species is filed, the service must determine whether the proposed population is indeed a distinct species or subgroup and whether it is at the threshold of endangerment. They must also study the role hatcheries might play in preserving or jeopardizing that stock. The lower Columbia River coho, for example, number more than a million fish, but these are nearly all hatchery stock. Oregon Trout is concerned that the wild lower river coho are a dying race.

Illustration by Frederika Spillman

Lorraine Bodi, the Fisheries Service attorney reviewing the status of Columbia Basin runs with regard to the Endangered Species Act, hopes to avoid having to list any basin stocks. She calls the Act "the law of last resort."

The fisheries service had begun action to list Columbia River stocks in 1978, when the Northwest Power Act was still under consideration in Congress. These actions were suspended when the Power Act was signed, and the Columbia River Basin Fish and Wildlife Program was called for to "protect, mitigate and enhance" the river's fish and their habitat. The caveat in the Power Act, however, was that "an adequate, efficient, economical and reliable power supply" should not be lost in the bargain.

But Bodi questions whether the fish and wildlife program has done enough to stop the decline of the runs. Particularly on the Snake River, she says the flows provided for fish are "a compromise of a compromise of a compromise." Her agency and other fisheries managers are proposing a new regime for operating the basin's dams during the spring outmigration of young salmon and steelhead.

Negotiating a solution now could give the region more flexibility in how it runs its river system, according to Bodi. If any Columbia River stocks are listed, Bodi says the consequences are hard to predict. The U.S. Supreme Court has said that the Endangered Species Act "reveals a conscious decision by Congress to give endangered species priority over the 'primary missions' of federal agencies."

Listing a species as endangered could stop virtually all development or activity that might harm that species.

Thus, it is possible that no fishing of the listed stock would be permitted. Beyond that, Bodi speculates that the Columbia could become a "single-purpose system, with the Endangered Species Act calling the shots. We're not too thrilled about that," she adds.

These are, of course, not the first Columbia River Basin runs to die out. A 1984 stock assessment compiled by the Bonneville Power Administration listed seven basin salmon or steelhead runs that were extinct at that time.

Another 15 salmon stocks (populations that move into specific river or tributary reaches at specific times) were considered on their way to extinction in the Bonneville report.

In 1987, the Northwest Power Planning Council reviewed the status of Snake River runs and found that about 22 Snake River salmon and steelhead stocks had fewer than 1,000 fish returning up the river. At that time, the Council reported that between 400 and 1,000 fish in each stock would be needed to maintain that population's viability.

A more recent draft report prepared by members of the American Fisheries Society's Endangered Species Committee, lists 13 Columbia River Basin native runs (as opposed to hatchery–supported runs) as "depressed and declining," including the two Snake River runs that are considered extinct. A dozen more Columbia Basin wild runs are described as "depressed and stable," in the Fisheries Society's draft.

Most of these runs originate in basins above Bonneville Dam. Bonneville and the 18 major dams and hundreds of minor dams above it have been blamed for about three–quarters of the decline of these runs. Overfishing, irrigation withdrawals and the general development of the Northwest from a wilderness into an industrialized society account for the remaining quarter of the losses.

The rivers now serve many purposes: power generation, recreation, navigation, irrigation, as well as the fisheries. The press of all this use challenges the remaining runs' precarious balance.

The Columbia's bad news is a mirror of the growing list of extinct fish reported in *Fisheries*, the publication of the American Fisheries Society. The Society numbered 27 species and 13 subspecies of fish that have gone extinct in the past century. In a related report in the same issue (Volume 14, Number 6), the Society added 139 fish to their list of fish that are endangered, threatened or of special concern. The complete list, which includes the United States, Canada and Mexico, numbers 364 fish species in these three categories.

Point of View

W. Lester Bryan

with Dulcy Mahar

A look at new resources from the utility's perspective.

Portrait by Lynn Carson

W. Lester Bryan, better known as Les, is a man who exudes enthusiasm when he talks about his job. "I like the challenge of trying to make things happen," he explains. "I like putting business arrangements together, and I think the challenge of bringing parties together when they have opposing views, although it can be very difficult and frustrating, is also very rewarding when it happens."

Bryan is vice president for power supply at Washington Water Power Company. The investor–owned utility, based in Spokane, serves nearly 250,000 customers in eastern Washington and northern Idaho. Bryan is also chair of the system planning committee for the Pacific Northwest Utilities Conference Committee (PNUCC). He and his committee have been working closely with the Northwest Power Planning Council in the development of the new Northwest Power Plan.

While Bryan obviously loves working in power sales, it was not his original choice. When he was considering careers, he thought about pharmacy, but then someone told him there was a lot of money in electrical engineering.

"Well, in that case I'll be an electrical engineer," he announced as he headed for Washington State University. He considers himself very lucky that when he graduated and went to work for his first utility—Puget Sound Power and Light Company—they found a niche for him in the power supply area.

After spending seven years with Puget Power, Bryan joined Washington Water Power, also in power supply. "I think the power supply area tends to be more business oriented than any other area in the utility, as far as where you might find an electrical engineer," Bryan explains. "So I have been very much at home in this area. I guess I have exceeded all of my expectations as far as career satisfaction. I am just amazed at the opportunities that I have been given."

Q. Can you tell me what the Pacific Northwest Utilities Conference Committee's (PNUCC) system planning committee does, what its role is and particularly, what its connection is with the Council's new power plan?

The system planning committee was set up by the PNUCC board basically to develop a resource plan for the utilities in the region. This committee existed long before the regional Power Council came into being. We have kind of been marking time while the region worked its way out of the surplus.

In this last year, the members of PNUCC and the system planning committee concluded that it was time we became more involved and work constructively to develop a regional plan that the utilities can accept, instead of shooting out barbs as we had in the past. So we set some goals and objectives early last April, and I think that the process has been moving ahead on a positive basis.

The real challenge is to try to take those different resource estimates and put them into a portfolio.

We have been working and meeting on a regular basis with the regional Council staff. We have committed utility resources to provide positive input wherever we could. As you know, we have been following each of the issues as they've been developed and discussed in the public forum, so that megawatt estimates of potential resources would be set at a level that we felt reasonably comfortable with. Now the real challenge is to try to take those different resource estimates and put them into a portfolio.

Basically, what you have in the system planning committee are power supply managers whose role in their individual utilities is to develop resources and resource strategies for their individual companies. The committee is trying to meld those individual strategies into a consensus, hopefully a consensus that will cut across and be accepted by the entire region.

We must have a plan where the utilities say, "Yes, this is a plan that we can buy into and support."

Q. Do you feel that PNUCC has been able to participate enough in the process?

We have worked very hard on positive participation, and I have to give much of the credit to the PNUCC staff. They have taken the challenge and have been a real help in trying to get the utilities together to reach consensus. You have the generating utilities as well as Bonneville's full requirement customers all driven by different objectives.

I have really been impressed with the way everybody has pulled together, and I think a part of that has been the cooperation and the commitment that Jim Litchfield [the Council's power planning manager] and his people have made in trying to involve the PNUCC members more directly in the development of the resource alternatives.

Q. Do you feel that the assumptions and technical data so far are reasonable? Are there some areas that you are uncomfortable with?

Estimates of some of the potential resources exceed my personal range of reasonableness. But I think what we have are the basic building blocks. How we place those building blocks together is where the proof of the pudding will be.

I'm optimistic that some of the resource estimates that I might view as extreme will be placed in the final resource portfolio where PNUCC members feel comfortable with them. Consensus on the portfolio will take a lot of compromise and discussion among the utilities, the customers of the region, and the regional Council. I'm looking forward to that. As I indicated up front, I don't necessarily buy into all of the resource assumptions as being viable, but I think that the current assumptions are reasonable at this stage. The assumptions will likely change as we begin the next phase.

Q. Which are the resource areas where you feel there has been too much optimism on the estimates?

I'm a little bit uncomfortable with the extent to which natural gas–fired resources will be included in the resource plan. I'm also uncomfortable with some of the exotics such as wind power. Even though people view wind power as a more environmentally benign alternative, I think the dependability and the cost of this type of resource are highly questionable.

We have a lot to learn on the development of cogeneration, its availability and risks. Some of the utilities that have gone out with requests for proposals are finding that the issue of who carries the risk on cogeneration development is a real tough nut to crack when you go through and evaluate the development of these resources. Of course, a lot of [the cogeneration projects] are also fired with natural gas, so you have further dependency on natural gas.

We have also had questions relative to conservation estimates. I don't see those as being outside the range of reasonableness. I think that we'll end up working out differences in those areas without too much trouble.

The portfolio is where the system planning committee is really put to the test, because this is where the real work is. Once we've listed resource alternatives and the potential megawatt capability, the tough part is shaping those alternatives into a plan that is workable and provides the region the flexibility to deal with changes and uncertainty, as well as meeting the least–cost test. Of course, we must have a plan where the utilities say, "Yes, this is a plan that we can buy into and support."

Q. What do you consider the key issues the region is facing as we develop the new power plan?

The issue that probably would concern me the most is the issue of uncertainty and how we are going to deal with either increases or decreases in projected growth in the region. There are a lot of people who feel that we have underestimated our load growth, especially since we are currently seeing load growth that is in excess of the average that we're forecasting.

Whether this is just a short–run situation we're experiencing, I don't know, but I am convinced that there will be an awful lot of changes in the way that energy is supplied to our consumers. This is my personal view. To me, the single biggest issue when you develop a 20–year plan is to construct it in a way that addresses the issues of uncertainty.

Q. One of the concerns the Council has had is that utilities are a bit gun–shy about making resource acquisitions now. What kinds of actions do you think the plan should be calling for?

We need to aggressively work on the development of conservation, load management and a feed–back system so we can feel comfortable that we know what's happening out there and what savings we're achieving. The effort in conservation is cumulative, so I think that conservation should be dealt with aggressively. I know that my company plans to aggressively move into that area this year.

Some of the other IOUs [investor–owned utilities] have been way ahead of Water Power as far as what they've been doing. Both Puget [Sound Power and Light Company] and Pacific [Power and Light Company] as well as Portland General [Electric Company] have been moving pretty aggressively in the area of conservation. I would say that action needs to be taken fairly quickly.

We need to review the bidding process[1] that is currently taking place. Puget has just completed a bidding process. Water Power will be going out this year with a request for proposals. PNUCC is

To me, the single biggest issue when you develop a 20–year plan is to construct it in a way that addresses uncertainty.

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[1] Bidding refers to a process by which utilities seek bids for power resources from independent developers as an alternative to building their own resources.

trying to work with Bonneville to develop a partnership for bidding. We need to evaluate the types of resources that are coming to the table, to get a feel for what we have there. I see the bidding process—getting private developers to develop new resources—as being something that we should work very hard at over the next few years.

Also, as a part of developing resources by third parties—in other words, through the bidding process—I think a key is to develop acquisition agreements with Bonneville so that a partnership can indeed be developed, and Bonneville can acquire those resources through a utility. To date, I know of no acquisition agreement that Bonneville has entered into with a utility to acquire a generating resource. There is a hydro project they have acquired, but I'm not sure how that is working. We need to work on the development of acquisition agreements.

The concern that the Council has is very real. Utilities all across this country found out that building [power plants to generate electricity] to a surplus didn't work. Utility commissions disallowed facilities and rate bases where their margins exceeded some standard that the commissions felt was appropriate. So there is a penalty for constructing to a surplus, and so far you don't know what penalty the utilities could discover for building to a deficit. There's a real concern in the utility community about building resources that may not be needed and then having to carry the cost for their customers or their shareholders.

There's a real concern in the utility community about building resources that may not be needed and then having to carry the cost for their customers or their shareholders.

So, I would work on actions to develop resources that are either developed by our customers or by independent resource developers. We need to test the "optioning"[2] process and see how it works, whether it's optioning of a coal–fired plant or gas–fired turbines. We need to have some base–load resources available to us and be prepared to bring those on line in the late 1990s, if conservation and cogeneration don't materialize.

Q. What role do you think Bonneville should play in the regional utility system?

I believe Bonneville should be a facilitator, and the utilities should be the ones that take action. While I recognize there are public agencies that rely on Bonneville's expertise in different areas, I believe it's the utilities in the region that should control their own destiny. The region's utilities need to be active in the resource development business, Bonneville should be facilitating that and encouraging the utilities to be the actors, rather than being an active player itself. My focus right now is to encourage the utilities to develop mechanisms whereby they would be the developers of resources.

Q. How do the investor–owned utilities in the region view the Council's plan? Is it something that can be useful to investor–owned utilities?

Even though investor–owned utilities may not be putting a requirement [for new power] on Bonneville, we view the Council's plan as a blueprint. I know the commissions that regulate us view it as a blueprint as to what our resource strategy ought to look like. Both the states of Idaho and Washington,[3] which regulate my company, have least–cost planning processes. Idaho doesn't call it a least–cost plan, but it's similar.

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[2] "Optioning" refers to a process in the Northwest Power Plan that phases resource development to allow time-consuming but relatively inexpensive siting and design of resources before a commitment to build is made. As actual resource needs become clearer, projects can be tabled or completed with less risk.

We see the Council's plan as being important in providing the foundation for our least–cost plan. We think the regional plan that is developed by the Council is very important to the decisions that the investor–owned utilities make, even though we may not be making them through the contractual arrangements set forth in the regional [Northwest Power] Act.

Q. In your least–cost plan, what activities has Washington Water Power identified for itself over the next few years?

We have identified conservation and development of cogeneration within our service territory, as well as purchases from other utilities as the resources that we will be developing to meet our loads over the next 10 to 15 years. Our first plan talked in generalities, and we are now in the process of updating that with a plan that would be more specific. A new section within our company is now trying to inventory and estimate energy management efforts.

As I indicated earlier, we are going out with our first request for proposal for generation on our system that could be developed by our customers or independent power producers. We are also exploring transmission interconnection as a further resource. We are currently discussing potential purchases with other utilities within the western systems group that may have resources that fit our needs.

We see the Council's plan as being important in providing the foundation for our least–cost plan.

Q. How do you feel about the relationship between the Council and the utility community now? Is it something that's improved? Is it a working relationship?

I would describe it as a relationship that has balance to it. We appreciate the fact that the Council's role is broader than that of the utilities. We think that our ultimate objectives are the same. But the Council has somewhat different constituencies to respond to than we do. In the case of my company, we have customers to respond to. Their interest is rates. We have shareholders to respond to. Their interest is earnings. We have employees to respond to, and their interest is a quality of life within the company.

We have the same objectives of providing a resource that is long term, that will provide low rates and will be there when we need it to cover our customers' requirements.

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[3] Oregon's Public Utility Commission also requires least–cost plans from investor–owned utilities.

But, both the Council and the company have different groups of people to respond to. We need to continue to have a lot of dialogue between the individual companies and the Council members so that we can better understand each other.

The development of this plan has been a positive movement in improving and building—and I'll use the word partnership again as we did with Bonneville—a partnership between the Council and the utilities. For the Council's plan to have impact, the utilities have to be supportive. I think that we are beginning to develop a positive relationship.

Obviously, the timing is important, because we've talked about a lot of things over the last several years, and now we're to the point where we're going to have to do something. I feel good about the relationship that we're developing. But we've got to keep at it. It's just like a marriage; you have to continue to communicate. I can't emphasize enough the importance of having those communications at the highest level between the Council and the individual companies.

For the Council's plan to have impact, the utilities have to be supportive.

We started out this interview recognizing that in the past there had been some degree of—maybe conflicts isn't the right word—differences of opinion between the technical people within the utilities and the staff of the Council, as well as the management of the companies and the regional Council members. We made the commitment within PNUCC to work positively in the process to develop a plan. At the same time, the regional Power Council made that same commitment to us. I believe both of us have followed through on that commitment.

I can't say enough about the effort that has been given by Jim Litchfield and his people as well as the commitment that has been made by the individual utilities to try to make that happen. I think if you were to have asked Jim at the beginning of the process, he might have wondered if it was going to happen. I think it has. PNUCC, the staff of the Council and the PNUCC members have done just an outstanding job of working together in the development of the plan. ■

Utilities Learn The Least-cost Lesson

by Gordon Lee

The conclusion's the same; conservation is the region's most practical resource.

Ten years is a short time for an industry to undergo a wholesale change of attitude and culture. In the investor-owned utility business, corporate change at that pace is almost inconceivable.

But as a result of least-cost planning, it only took 10 years for investor-owned utilities in the Pacific Northwest to reverse entrenched attitudes about conservation and to embrace it as the primary element in resource planning. Least-cost planning is the process by which utilities can identify ways to meet various levels of customer demand at the lowest total cost.

This new orientation means utilities may be able to postpone the day they'll have to turn to other, more costly resources to meet growing customer demand. This will keep the region's low electricity rates—vital to its competitive advantage—among the lowest in the country.

"These least-cost plans are good for the utilities, their ratepayers and the region," says Northwest Power Planning Council Chairman Tom Trulove of Washington. "They're a vital step in meeting the Northwest's growing energy needs in the 1990s and beyond."

A decade ago, most investor–owned utilities in the Pacific Northwest didn't look to conservation as a new resource. Conservation wasn't on their lists of energy sources they'd turn to for large, steady supplies of electricity when demand started to rise.

Rather, utilities much preferred to tie their resource planning to more tangible facilities that were familiar—hydropower dams, coal plants or nuclear reactors. Conservation was a resource many people associated with back–to–nature, Earth Mama types, not with sober assessments of regional resource solutions.

But today, conservation is the resource of first choice at all investor–owned utilities in the Northwest. Rather than build new central generating facilities, which may be costly and require lengthy development and construction periods, utilities in the region intend to turn first to conservation measures when they need new power. In contrast to traditional generating stations, those measures are comparatively inexpensive, easy to implement and their impact grows as energy demand rises.

Least–cost planning helped spur that change of heart. Utility regulators in Idaho, Oregon and Washington now require that utilities file least–cost plans and relate their rate cases and other actions to those plans. Each investor–owned utility in those states has completed or is about to finish a least–cost plan, in which it identifies how it intends to meet customers' electricity needs under a variety of economic conditions. That was an unknown exercise a decade ago. The accompanying boxes discuss plans at each utility.

Those least–cost plans should result in strategies to guide utility actions over the next 20 years. Least–cost plans identify how much power customers may need and ways utilities can meet those needs. Their goal? To keep utilities from overbuilding or underbuilding resources.

Least–cost planning is a multistage process. Identifying resource needs and options are just the preliminary steps. Plans display a timetable suggesting when utilities need to commit to new re-

Least–cost Lesson Plans...
Puget Sound Power and Light Company...

Puget Power is the utility in the region most experienced with least–cost planning, having recently submitted its second plan to the Washington Utilities and Transportation Commission.

In its plan—dubbed DARE, for Demand and Resource Evaluation—the Bellevue, Washington, utility acknowledges it soon will need new sources of power. With 616,000 customers in nine western Washington counties, Puget Power is the region's fastest-growing utility. It already relies on outside sources to meet part of its energy demand. And as that demand grows, the utility's predicted deficit increases.

"We've done our second least–cost plan, and every resource we look at is an enigma," notes Corey Knutsen, Puget Power's director of strategic planning.

Puget Power's first plan, released in 1987, pointed to conservation and power purchases as sources to meet much of the company's near–term demand growth. Following that plan, Puget Power acquired 12 megawatts from new conservation efforts in the past two years, boosting the amount of electricity its conservation efforts capture to 85 megawatts, or 4 percent of its 2,000–megawatt demand today. It also signed 15– and 20–year contracts to buy 460 megawatts from the Bonneville Power Administration, other utilities, independent power producers and cogenerators.

Puget Power's energy needs don't stop there, however. Its most recent plan suggests that by the year 2010 its demand for power will climb another 720 megawatts to 3,650 megawatts. Conservation could supply up to 280 megawatts of that new need. Purchases of low–cost power from British Columbia Hydro and Power Authority (BC Hydro) and other domestic utilities and from independent suppliers through competitive bidding make up the utility's other top resource priorities. However, many of those purchases would require new or expanded transmission lines or greater access to Bonneville's transmission network.

sources. They also lay out a sequence according to which a utility could acquire new resources for the least cost. Those calculations reflect not only dollar costs, but also factor risks and environmental impacts associated with various resources.

The utilities' least-cost plans couldn't have come at a better time. They coincide with the Council's effort to draft a new power plan for the four Northwest states, its third regional plan since the Council was conceived by Congress in 1980. The least-cost plans crafted by investor-owned utilities—some of whose service territories are in the fastest-growing parts of the region—will help set the context in which the region will implement the Council's plan.

For utilities, the least-cost exercise is time consuming and intellectually challenging. "The thing we're struggling with the hardest is how much conservation is out there and at what cost," notes Joe Marshall, chief executive officer of Idaho Power Company. "The bulk of our spending today is on identifying and validating how much conservation is there. Once we validate, we'll treat it like any other resource."

State regulators add another level of challenge. They may apply different tests to least-cost efforts than the Council or investor-owned utilities. "The interesting thing is that investor-owned utilities have to get things into rate base," Marshall adds. "It doesn't matter much what the Power Planning Council or the utilities say is least-cost, if our commissions don't let us put it into rate base."

In the Northwest, interest in conservation isn't surprising or new. It's been part of the region's energy picture for years. But never before have investor-owned utilities widely and formally placed conservation on equal footing with other resources.

The shift in attitude is partly institutional. Conservation is the resource of choice in the Northwest Power Act, the 1980 law that resulted in creation of the Council. The Act requires that the Council give priority to conserva-

...Idaho Power Company...

> "The thing we're struggling with the hardest is how much conservation is out there and at what cost."
>
> *—Joe Marshall*
> *Idaho Power Company*

Photo by Garrett Photography

Its least-cost plan won't go to state regulators until 1991, but early evaluations suggest that Idaho Power will be able to turn to conservation when it needs new resources.

The utility predicts that the amount of power its customers consume may climb 514 megawatts to 831 megawatts by the year 2008, depending on how fast the economy in its service territory grows. Currently, its 245,000 customers in Idaho and eastern Washington consume some 1,454 megawatts.

Idaho Power executives say the company's current array of resources will be able to handle the most likely levels of increased demand throughout the 1990s. Only at the turn of the century will the company need to look to new sources of power.

Conservation tops the list of new resources that Idaho Power may turn to, says John Willmorth, manager of resource planning. The company's initial least-cost analyses also suggest that new hydropower projects may be another source of additional low-cost power. The company could add more generators at some existing dams, and it may be able to produce power in irrigation canals that crisscross its service territory, Willmorth notes.

tion when it assesses new resources. The Act also considers conservation a wise investment even if it costs 10 percent more than the next most–competitive new resource because of its environmental acceptability and ease of implementation.

Conservation was the dominant theme of the Council's 1983 and 1986 regional power plans. And it's likely to loom just as large in the next one, as the region's energy surplus disappears and as environmental fears and global warming considerations surrounding other resources become more pronounced.

Conservation in this context means using energy wisely, being energy smart and energy–efficient. It means employing the latest high–tech solutions to energy problems. It means stretching out a given unit of energy, making it do more. It does not mean doing with less. It doesn't mean heavy sweaters, long underwear or sweltering summertime indoor temperatures.

Congress also mandated least–cost planning when it authorized the Council. In the Northwest Power Act, it directed the Council to engage in planning that gives priority to cost–effective resources. That means resources that will be reliable and available when needed, ones supplying power as cheaply or cheaper than the least–costly, similarly reliable, available and environmentally acceptable alternative or combination of alternatives.

The Council's least–cost planning weighs the need for resources, their relative cost, reliability and availability. It suggests that the region buy only resources it needs, and calculate their price by counting all known and anticipated costs on a consistent basis.

Over the past eight years, the Council has become a national and international model for least–cost planning. Its plans have become the springboard for investor–owned utility planning efforts in the region.

...Pacific Power and Light Company...

In its 1989 least–cost plan, Pacific Power and Light forecasts that its power demand could climb 550 megawatts to 3,000 megawatts by the year 2008, depending upon economic growth in the region. That amounts to a growth in demand ranging from 11 percent to 61 percent, compared with the utility's 4,900–megawatt load today.

Pacific, which merged with Utah Power in 1989, serves 1.2 million customers in California, Idaho, Montana, Oregon, Utah, Washington and Wyoming. It expects that energy–efficiency programs can meet 360 megawatts to 600 megawatts of its system's new energy demand over the next 20 years. It also predicts that improvements made to its existing plants, dams and transmission equipment will yield 100 megawatts during the same period. More efficient management and operation of its existing system may yield another 300 megawatts.

The utility also points outside for as much as 700 megawatts. Under specific contractual rights, Pacific could obtain a little more than half that total from Bonneville and Southern California Edison. The balance would come from other sources.

"We're not betting the company on purchasing power from outside," says David Enberg, who heads Pacific's least–cost planning efforts. "But when we started thinking of purchases, we strategically started thinking about where the cheapest sources are. Right now, that's in the desert Southwest and Rocky Mountain regions. And we're very well connected with most of those entities through our Utah division."

Some of those utility plans are ambitious. Others are conservative.

But Council officials generally applaud the direction investor–owned utilities have taken and the common theme of conservation that each stresses. “We've been reviewing all the least–cost plans,” says Trulove. “While some are better than others, what's really important is that each investor–owned utility has set up a process—involving many elements of the company, including top management—that's extremely positive for the companies themselves and the region.”

...Washington Water Power Company...

In its year–old least–cost plan, the Spokane–based utility forecasts that its new power needs could range from zero to 393 megawatts, under low and high economic growth conditions, respectively.

That would be as much as a 39–percent jump in the company's 1,000–megawatt current load, which goes to 243,000 electricity customers in eastern Washington and northern Idaho.

To meet that new demand, “conservation was considered as the number one option due to price and availability,” the plan says. The utility figures it could obtain up to 35 megawatts from a variety of conservation measures. Douglas Young, the company's contracts and resource administrator, says that most of the conservation potential is in the industrial and commercial sectors of its service territory.

Another 156 megawatts may be available from independent, non–utility sources. The company has for several years held discussions with BC Hydro about a new cross-border transmission link that would give it access to an undisclosed amount of Canadian export energy.

Council analysts sound one note of caution, however. In addition to obtaining power from conservation, most utilities intend to meet new energy demand by buying power from other utilities in and outside the region. To the degree utilities point to different sellers, that strategy fits with the goals of least–cost planning, notes Jim Litchfield, director of the Council's power planning division. But if they expect to tap the same sources, the amount of power on the market may not satisfy their needs, nor will its cost be the least–expensive alternative. “We want to make sure they're not double–counting,” Litchfield says.

Fundamentally, least–cost planning helps companies better understand their goals and operations. It helps clarify relationships among different elements in the corporation.

"A planning process can aid decision-making by providing a consistent framework of assumptions and analyses," says Portland-based Pacific Power and Light Company in its least-cost plan. "A plan document is the compilation of the most current planning information, and a statement of the strategies or principals that will guide supply and demand decisions in the future. The primary accomplishment of the planning process is in the process itself—the understanding, insights, and information it generates—rather than in any specific set of actions identified."

...Portland General Electric.

The utility that serves 552,000 customers in and around the largest municipality in Oregon plans to file a least-cost plan with the Oregon Public Utilities Commission in June 1990. As a result, it still is studying which resources might be the least costly to bring on line when it needs new sources of power.

Nevertheless, the utility clearly favors conservation and other efficiency measures. "Conservation will be at the top of the list as our first resource option," notes Mike Mikoliatas, general manager of load and resource planning. Also high on the company's least-cost agenda: improving the efficiency of existing generation and transmission equipment and buying power from cogeneration projects.

"The energy-efficiency theme goes right through our resource planning," Mikoliatas adds.

Preliminary estimates—which may change before Portland General Electric releases its plan—suggest that the utility's demand for power over the next 20 years could climb 350 megawatts to 1,350 megawatts, depending on economic growth. That would amount to a 19-percent to 73-percent jump from today's demand of 1,850 megawatts. The company hasn't yet calculated how much of that demand growth conservation may be able to meet.

COLUMBIA RIVER CENSUS

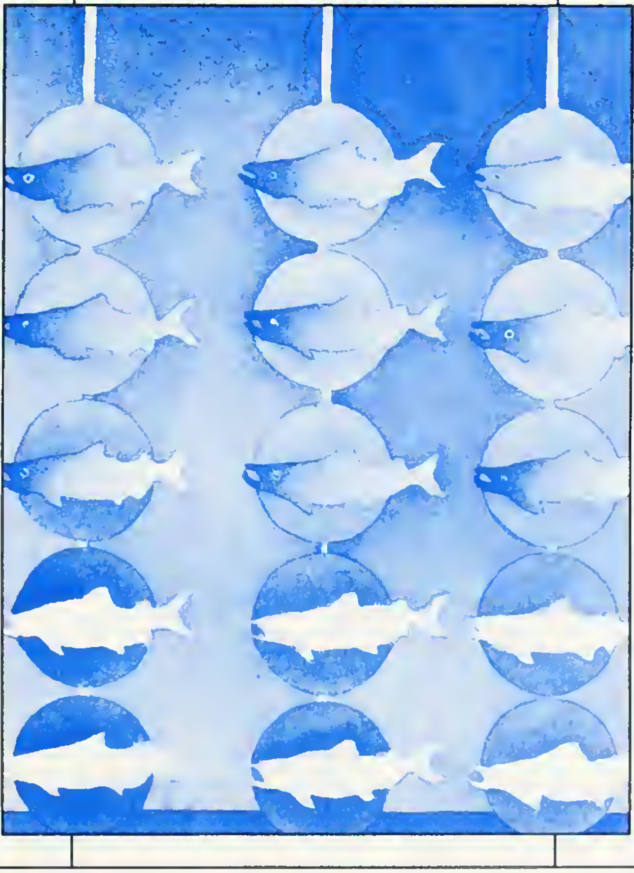
by Carlotta Collette

Salmon and steelhead counts rise and fall like the tide.

By most measures, 1984 was a vintage year for strong, young fall chinook in the Columbia River Basin. Steve King, a harvest biologist with the Oregon Department of Fish and Wildlife, calls the chinook born that year the "power brood." "They were outstanding ocean survivors," he adds, explaining that these are the sturdy salmon that climbed back up into the upper Columbia in impressive numbers beginning in 1986 and breaking records in 1987 and 1988.

These 1984 babies were blessed with heavy runoffs and a new "water budget" that helped wash them out to sea past the ominous barriers of the river's great dams. The water budget had been devised as part of the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program. It was a break from historical river operations in which the spring thaw would be held in the dams until power was needed later in the year.

With the water budget, some of the stored water is released during the major portion of the salmon and steelhead outmigration from April 15 through June 15. It decreases the travel time of tiny fish through the system.



So the power brood of 1984 returned as the record-breaking upriver runs of 1986, 1987 and 1988. Their ocean survival had been aided by the negotiation in 1985 (after more than 20 years' discussion) of the Pacific Salmon Interception Treaty between the United States and Canada. The treaty called for increased production and decreased ocean harvests of several stocks, among them many from the Columbia.

It looked as though the basin's runs were beginning to recuperate from a half-century nose dive. Few experts were willing to declare that the basin's increasing salmon and steelhead populations signaled an absolute reversal in the downward trend. But at the same time, there was

Illustration by Elsa Warnick

enough good news to at least take heart.

By 1987 and '88, the cut in ocean harvest, survival of the "power brood" and safer passage down the Columbia as a result of the fish and wildlife program appeared to be having an effect. In 1987, many runs topped the 10-year averages by 138 percent. In 1988, the runs were down slightly, but still numbered between 115 percent and 120 percent of the 10-year averages.

But the progeny of those great runs did not fare so well. 1987 and 1988 were among the driest years this basin has ever experienced. Particularly on the Snake River, where "bad water conditions in 1987 and 1988 nailed the sockeye and some of the steelhead," explains King. "Snake River passage conditions were horrible for steelhead and for spring chinook," he adds.

Those fish faced more stress heading out of the basin to the sea, and that stress may be one of the conditions that has led to reduced returns last year and projected continued declines for 1990.

Only two, or by some counts four, sockeye salmon made their way back up the Snake River in 1989. A fish that was once the favorite dried winter staple of the Nez Perce and other Idaho tribes is now considered "functionally" extinct. While sockeye runs tend to fluctuate more broadly than do other Columbia Basin species, the Snake River run—with one of the basin's longest and hardest climbs—had been down for more than a decade. Two years with low runoff and eight major dams to migrate past provided the one-two punch that appears to have knocked that run into history.

The Columbia's remaining sockeye runs are projected to be down this year, too, along with coho and all of the fall chinook runs. Only the Columbia River spring chinook runs look promising. "The spring runs are the bright spot in our projections," says King. The spring chinook run up the Willamette River in western Oregon is expected to break all previous records with an estimated count approaching 128,000. The upper river spring chinook runs also look as though they'll approach record highs.

But anglers after winter steelhead were more often than not disappointed. And King predicts that even fall chinook that originate below Bonneville Dam, the closest dam to the river's mouth, will make a depressing showing. In fact, one fall chinook population, known as the lower river tules, are expected to come in in record low numbers this year—only 68,500. Biologists figure they need 70,000 of these fish just to meet hatchery needs, so sport and commercial harvests both in the ocean and in the river are likely to be trimmed to protect the remaining numbers. The wild run of lower river falls, a chinook that makes its home mostly in the Lewis River in Washington, is at its lowest level since 1985.

For nearly half a century, fisheries biologists and others have blamed the dams first as the runs began to decline. The Council figured that roughly 75 percent of the Columbia's lost salmon bounty can trace its demise to the hydropower system. But the dams are not the likely culprit this year; many of the reduced runs are in the lower basin below or just above Bonneville Dam.

A fish that was once the favorite dried winter staple of the Nez Perce and other Idaho tribes is now considered "functionally" extinct.

"The reduced upriver runs in 1989 and 1990 could be partly the result of those dry years in '87 and '88," theorizes King, "but the lower river drops have to be an ocean problem, because these fish weren't in the river that much. They didn't have to deal with a lot of dams."

At first, many experts blamed high-seas squid harvesters who spread what are known as "drift nets" over thousands of miles of ocean. These nets measure about 30 miles across. In addition to squid, they haul in everything that swims within reach—dolphins, salmon, even sea birds. Limited monitoring of this fishery suggests that Columbia River salmon and steelhead are among the millions of fish captured along with the squid.

But the drift-net harvesters do not appear to be at fault for this year's suffering salmon runs, as far as King is concerned. He argues that few Columbia Basin salmon travel far enough from shore to be taken in the massive nets.

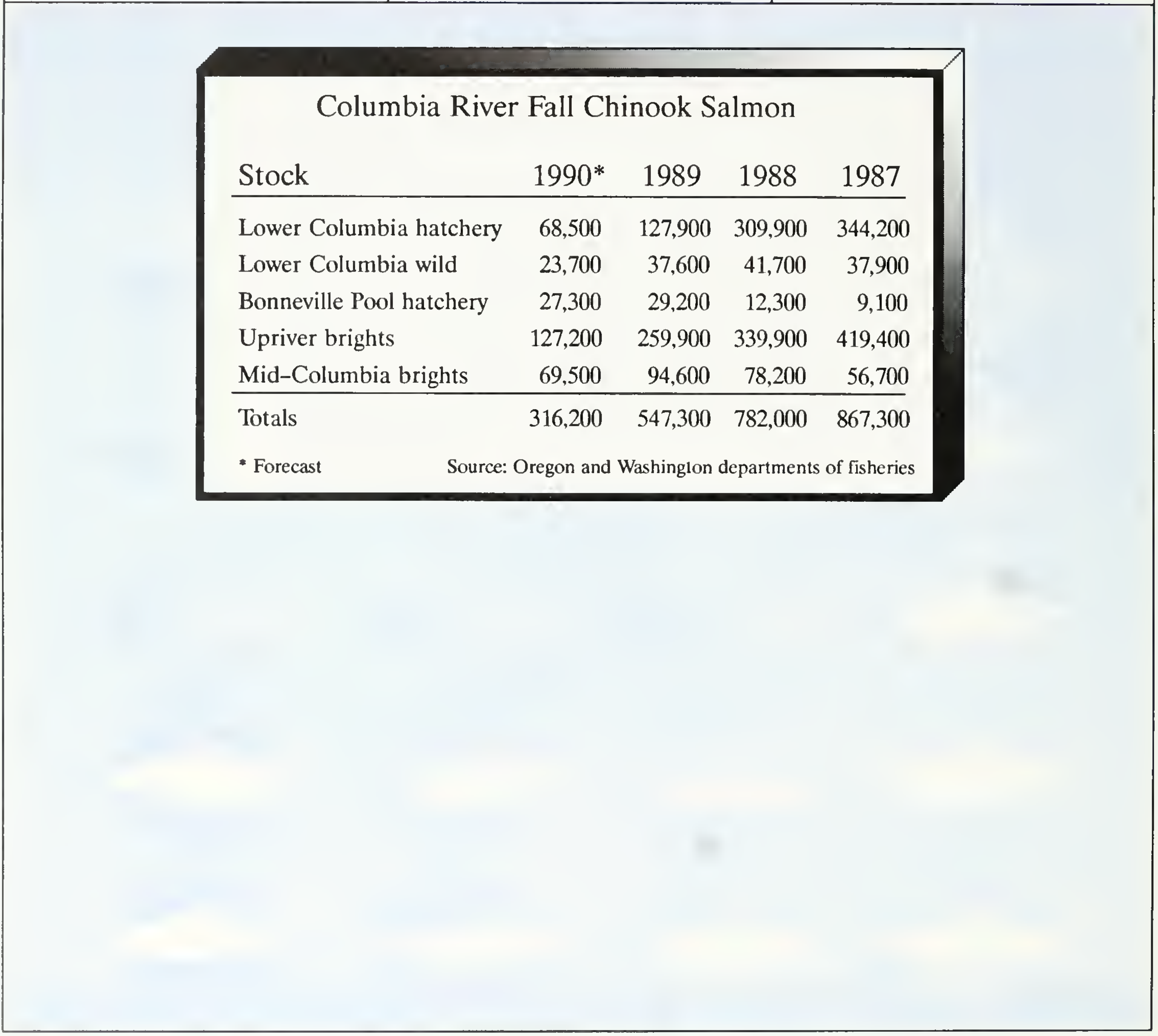
The problem is more likely one of food availability in the ocean, King suggests. The various stocks feed in different parts of the ocean before returning to the mouth of the Columbia. That could account for the unevenness of the run's performance.

Jim Martin, Oregon Department of Fish and Wildlife's fisheries chief warned fisheries managers of the coming drop in returns last fall, when he reported on the status of the runs at the Council's "Salmon and Steelhead Round Table." The round table provides managers the opportunity to reflect on the region's progress toward increasing the salmon and steelhead runs. "As a whole," Martin said to the gathered fisheries managers, "we have slightly more fish [than in 1980]." He suggested that the runs had risen from 2.5 million to about 2.8 million by 1989.

Martin voiced concern, however, that even that slight increase was largely driven by hatchery stocks, and "all those stocks are showing sequential drops over the last three years." Martin had no more answers last fall than does King, this spring.

But Karen Pratt, who with Dr. Don Chapman reviewed the status of the runs for the Pacific Northwest Utilities Conference Committee, offered more optimism to the round table participants last fall. Pratt and Chapman's analysis looked at three-year trends rather than just annual dam counts of fish. In their study, the runs looked less precarious than the Oregon Department's perspective might suggest. "Even though there's a dip now, similar to in 1982," noted Pratt, "it may average out to overall increases." ■

The runs had risen from 2.5 million to about 2.8 million by 1989.



Columbia River Fall Chinook Salmon

Stock	1990*	1989	1988	1987
Lower Columbia hatchery	68,500	127,900	309,900	344,200
Lower Columbia wild	23,700	37,600	41,700	37,900
Bonneville Pool hatchery	27,300	29,200	12,300	9,100
Upriver brights	127,200	259,900	339,900	419,400
Mid-Columbia brights	69,500	94,600	78,200	56,700
Totals	316,200	547,300	782,000	867,300

* Forecast

Source: Oregon and Washington departments of fisheries

Chart by Stephen Sasser and Judy Gibson

CALIFORNIA RE-ENTERS the CONSERVATION CHALLENGE

Illustration by Jud Guitteau

by Carlotta Collette

ONETIME ADVERSARIES CHART THE STATE'S ENERGY WATERS

CALIFORNIANS take an almost perverse pride in being out ahead of the rest of the nation. It might have something to do with being at the western edge, as far across the frontier as the wagons could go. Where the land ended, some Californians built new frontiers, new social patterns, new ideals and new ethics. The state's early lead in bringing out the best and the most energy-efficiency legislation and innovations was one example.

For years, California utilities led the world with their remarkable investments that made it clear they considered conserved energy to be as good a resource as any generating plant. The California Energy Commission, for example, determined that "the state's ability to outperform the nation in energy productivity saved Californians some $23 billion from 1973-1985."

Then the conservation spending subsided. A statewide surplus in generating capability combined with lower gas and oil prices were used as reason enough to cut back on conservation spending. Energy savings were seen as lost revenues for the utilities. Arguments justifying conservation programs as long-term investments in keeping utility system costs down lost out to near-term economic decisions.

Between 1984 and 1987, utility spending for conservation in California dropped 55 percent, from $164 million per year to less than $75 million, according to Michael Messenger, senior economist with the California Energy Commission. "If the conservation numbers kept declining at that rate, by 1992 the utilities would be spending zero dollars on conservation," he says.

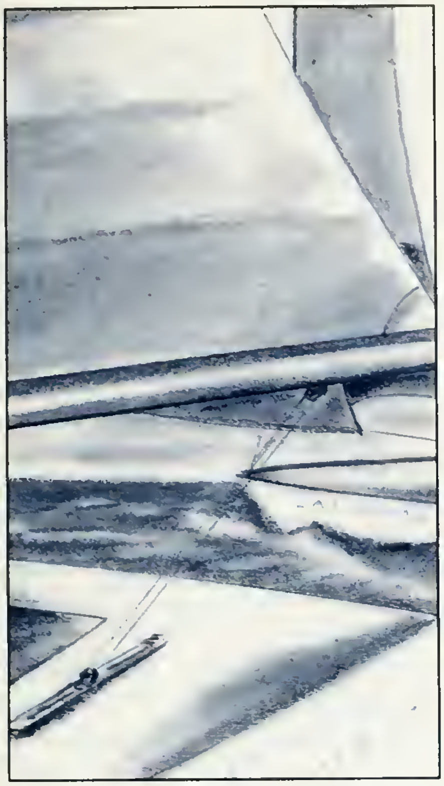
Other states and regions began to pull ahead of the Golden State, running conservation programs that seemed to dwarf California's. In the Pacific Northwest, the Midwest and most recently in New England, the conservation ethic caught on.

Between 1984 and 1987, utility spending for conservation in California dropped 55 percent.

In the Northwest, thanks to the Northwest Power Act of 1980, the whole region was moving toward a more efficient future. "Least-cost planning," a process pioneered by the Northwest Power Planning Council through which utilities purchase new power based on the relative cost-effectiveness of resources, is now being practiced in more than 30 states. California was clearly out of the conservation headlines.

Such a state of events was deemed untenable by California's conservation advocates. On July 6, 1989, the Natural Resources Defense Council published a report that documented, in the words of the report's author, Ralph Cavanagh, "this dramatic drop in utility expenditures for and commitment to energy efficiency." Two weeks later, the report was reviewed by the California Public Utilities Commission.

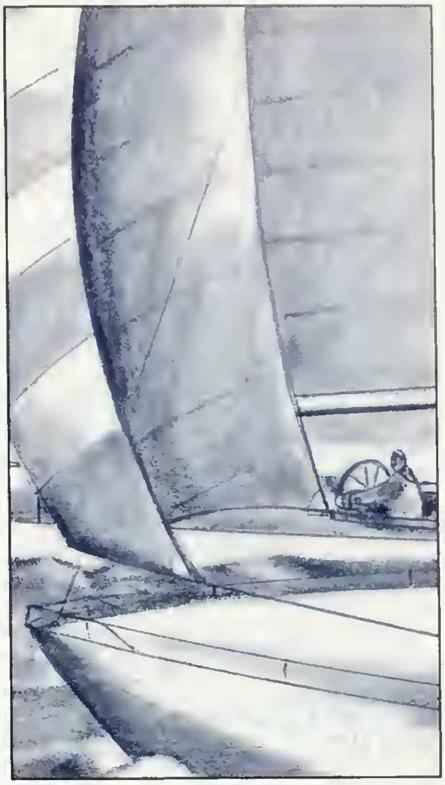
Expert witnesses from around the country reiterated the virtues of efficiency and proclaimed California's proximity to being an also-ran in the national conservation community. Little or no argument was heard from the Commission members. Even the utilities, Cavanagh asserts, con-



In the Northwest, the whole region was moving toward a more efficient future.

curred substantially with the report's findings.

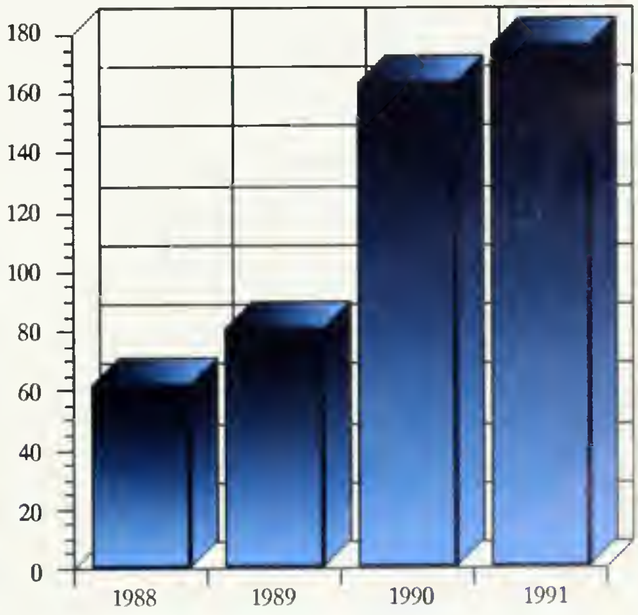
Bruised pride and prudent economics won the day. California took up the challenge. The state's largest gas and electric utilities, including the two largest investor-owned utilities in North America and the largest gas-distributing utility, went to work with California's major conservation groups. Energy consumers in all sectors—residential, commercial, industrial and agricultural—were represented. The California Energy Commission, Public Utilities Commission, the Independent Energy Producers Association, the Association of California Water Agencies, the state's Department of General Services and others joined in.



They set a six-month agenda and produced on schedule *An Energy Efficiency Blueprint for California*. "It was our way of saying, California is back!" explains Cavanagh. The blueprint called for a doubling of conservation spending from the 1988 levels. The goal is to spend $147 million

Projected Trends in Electricity Savings*

From Expanded Pacific Gas and Electric, San Diego Gas and Electric, and Southern California Edison Efficiency Programs (average megawatts)



* Note: Estimates for gas savings are not complete at this time.

Charts by Stephen Sasser and Judy Gibson

more each year on conservation programs by 1991, or "as fast as we can responsibly ramp up," Cavanagh adds.

The key to utility cooperation is a set of proposed reforms in the regulatory process. In the early 1980s, California utility regulators decoupled utilities' earnings from the amount of profit they were allowed to earn. They adopted a policy of adjusting allowable power rates to compensate for conservation-induced revenue shortfalls. But this involved complicated calculations to factor out variables such as the weather.

The proposed regulatory changes would go beyond this. "If we want utilities to concentrate on efficiency," reasons G. Mitchell Wilk, president of the California Public Utilities Commission, "we have to make it pay. Fundamental economic principles dictate that companies set goals according to their pocketbooks."

Consequently, under the new regulations, utilities that succeed in meeting or exceeding efficiency goals could be granted a higher overall profit margin. Conversely, utilities that fail to meet or exceed the state's efficiency goals can lose some of their granted profit margin. "They can either lose money by doing badly, or make money by doing well," says Cavanagh.

> **Utilities that succeed in meeting or exceeding efficiency goals could be granted a higher overall profit margin.**

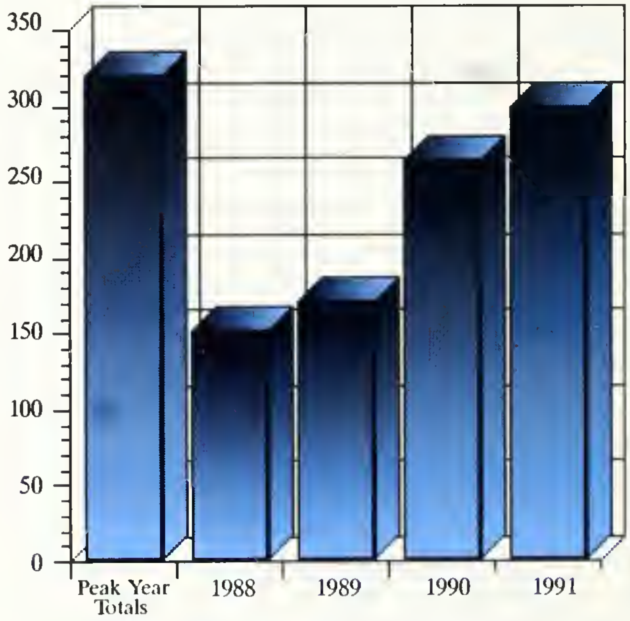
To "do well," each of the collaborating utilities is exploring which incentives will best support increased conservation spending. Pacific Gas and Electric, for example, is looking at a "shared savings" system that would give the utility's shareholders a percent of the estimated dollar savings from energy-efficiency programs.

The utilities also are planning specific research and energy saving programs they will operate. Members of the collaborative and outside consultants are participating in this process. Each of the utilities is gearing up to run or expand programs that will save energy in every sector of the state. This includes efficiency improvements in the residential, commercial, industrial and agricultural sectors. Since California's economy is the sixth largest in the world, savings in the state are expected to be substantial.

To further refine California's focus on its commerce, industries and agriculture, Pacific Gas and Electric is underwriting several

California Efficiency-Program Spending Trends*

(nominal $ million)



* These totals refer to program spending by California's four largest utilities: Pacific Gas and Electric, Southern California Edison, San Diego Gas and Electric and Southern California Gas.

substantial research endeavors. Modeled after the Seattle Lighting Laboratory, the utility is planning to open its own Lighting Technology Center in 1990. The center will aid architects, builders and business leaders in choosing the most efficient means of lighting their facilities.

Pacific Gas and Electric is also considering a Food and Agricultural Technical Center for Northern California. The center would study efficiency in both food production and food processing—two of California's major industries.

A third research project may have even broader implications. The utility has brought together the Rocky Mountain Institute (Amory Lovins' Colorado resource conservation research facility), Lawrence Berkeley Laboratory and the Natural Resources Defense Council to conduct a multiyear investigation of advanced lighting, building design, electric motor and other efficiency technologies. Their goal is to determine actual performance and cost characteristics of these technologies in residential, commercial, industrial and agricultural applications.

Information from each of these innovative research projects will help California utilities design better energy saving programs. But the blueprint is only the first step in the process. The utilities are drafting their plans as applications to the California Public Utilities Commission. The commission then decides whether the proposals are worthy of further action.

Commission President Wilk suggests that "the collaborative proposals mark a new era for energy utilities and for this commission. Utilities today should be selling energy efficiency not just energy. In the 1990s," he adds, "we want to add value to every kilowatt or gas molecule used in California by making sure we minimize waste in energy production and energy consumption."

The commission is on record declaring: "In an era of increasing domestic and international competition, California's outstanding economic strength and environmental protection rest, at least in part, on a foundation of energy efficiency."

In a recent two-page advertisement in a national business publication, Pacific Gas and Electric seemed to concur: "It's no secret that much of the future performance of American business and industry depends on the efficient use of energy," the advertisement stated.

The Californians who met and worked together to build that state's blueprint for energy efficiency have written, "We believe that the process that produced this report will make possible the single biggest leap forward for energy efficiency in California since utility demand-side management programs were first introduced."

> **"Much of the future performance of American business and industry depends on the efficient use of energy."**
>
> *— Pacific Gas and Electric*

Commissioner Wilk adds, "The collaborative applications give us a chance to prove that everyone can be a winner; consumers can save money on their gas and electric bills, and utilities can make money on conservation through carefully planned incentive programs."

Heads up to the rest of the pack; California is trimming its sails and moving into the lead once again. ■

SHORTS

Oregon will pay $1 for each adult squawfish caught in the reservoir behind the John Day Dam on the Columbia River. The Oregon Department of Fish and Wildlife made the offer in the hope that the bounty will help slash the number of squawfish, which it blames for eating 14 percent of the ocean-bound juvenile salmon and steelhead at the dam last year. [Source: *The* (Portland) *Oregonian*, 2/26/90.]

New compact fuel cells using hydrogen and air to produce electricity could one day replace conventional lead-acid batteries.

That's the prediction of scientists at Bell Communications Research in New Jersey, who developed the cells. The new devices—smaller, lighter and more efficient than current-technology batteries—may power anything from automobiles to telephones, the scientists said in announcing the invention.

Fuel cells generate electricity through chemical reactions among gases or other chemicals. They don't need to be recharged with electricity when they run down, unlike conventional batteries. Instead, recharging them only requires new doses of gas or chemicals.

These experimental Bell cells, still only small laboratory prototypes, contain a thin, gas-permeable membrane of aluminum oxide sandwiched between two layers of platinum. When a mixture of gas and hydrogen circulates through the film, the resulting chemical reaction combines hydrogen and oxygen into water, releasing electricity.

If mass produced, the cells could be built for $1,000 a kilowatt, compared with $3,000 to $5,000 a kilowatt for existing fuel cells, the Bell scientists said. [Source: *Nature*, 2/8/90.]

Dan Evans has been elected to the board of directors of Puget Sound Power and Light Company in Bellevue, Washington.

The former United States Senator and governor of Washington, and the first chairman of the Northwest Power Planning Council, became a Puget Power director in March 1990. A member of numerous boards and civic organizations, Evans currently serves as chairman of the National Academy of Sciences commission on policy options for global warming. [Source: Puget Sound Power and Light Company, 3/90.]

The U.S. Bureau of Land Management and the Nature Conservancy have agreed to combine efforts to preserve wildlife populations and habitat.

The agreement, signed in March by the private, non-profit Nature Conservancy and the bureau, establishes a public/private partnership to save endangered and rare animals and plants on 40 percent of the country's public lands. The bureau oversees 270 million acres, equal to one-eighth of the land mass of the continental United States.

The agreement gives the green light to local bureau officials to work with the Nature Conservancy on strategies to protect threatened species and ecosystems. Started 36 years ago, the Nature Conservancy acquires private lands to keep as wilderness preserves. It owns and manages some 900 nature preserves on more than 5 million acres in the United States and Latin America. [Source: *The* (Portland) *Oregonian*, 3/24/90.]

Oregon received the second-highest number of people who immigrated from California between mid-1988 and mid-1989, a recent nationwide study reveals. Washington ranked ninth in the nation. Some 21,000 Californians moved to Oregon during the period; 8,600 moved to the Evergreen State. Arizona ranked first, absorbing 23,000 new residents from California during the period. [Source: *American Demographics*, 1/90.]

Puget Sound Power and Light Company has chosen eight outside, non-utility sources to supply it with 137 megawatts of electricity within two years. In Washington state's first competitive bidding process, Puget last fall called for proposals from outside developers to supply it with electricity. A gas-fired cogeneration facility in Bellingham, Washington; a geothermal plant in Surprise Valley, California; a municipal solid waste facility in Pierce County, Washington; and five conservation programs were the proposals Puget chose from among 40 submitted by 29 developers. They'll begin to supply power—5 percent to 7 percent of Puget's expected demand—in 1993. [Source: *Clearing Up*, 3/2/90.]

—Compiled by Gordon Lee

CALENDAR

May 9–10—Northwest Power Planning Council meeting at the Shilo Inn in Idaho Falls, Idaho.

June 13–14—Northwest Power Planning Council meeting at the Westcoast Ridpath Hotel in Spokane, Washington.

July 11–12—Northwest Power Planning Council meeting at the Outlaw Inn in Kalispell, Montana.

July 29–August 3—"Indoor Air '90: The Fifth International Conference on Indoor Air Quality and Climate" in Toronto, Canada. Sponsored by the Building Owners and Managers Association International, the Center for Indoor Air Research, U.S. Department of Energy and others. For more information: Indoor Air '90, c/o Canada Mortgage and Housing Corporation, 682 Montreal Road, Ottawa, Ontario, Canada K1A 0P7, 613–748–2714 or 748–2715.

August 8–9—Northwest Power Planning Council meeting in Oregon.

August 17–19—Midwest Renewable Energy Fair in Amherst, Wisconsin. For more information: Midwest Renewable Energy Fair, 286 Wilson Street, Amherst, Wisconsin 54406, 715–592–4458.

August 26–September 1—"1990 Summer Study on Energy Efficiency in Buildings" at the Asilomar Conference Center in Pacific Grove, California. Sponsored by the American Council for an Energy-Efficient Economy. For more information: Lawrence Berkeley Laboratory, ACEEE 1990 Summer Study Office, Building 90H, Berkeley, California 94720, 415–486–7478.

September 23–28—"World Renewable Energy Conference" in Reading, United Kingdom. Sponsored by the University of Reading. For more information: Professor A.A.M. Sayigh, Congress Chairman, Department of Engineering, University of Reading, Whiteknights, P.O. Box 225, Reading Berkshire, RG6 2AY, UK.

A more detailed calendar of Council committee meetings and consultations is carried each month in *Update!* See order form on back cover.

Compiled by Ruth L. Curtis

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Taking a Reading on Renewables

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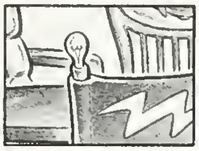

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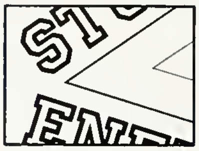

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Editor's Notes

The new Northwest Power Plan is still a major focus of efforts at the Council. As I write, computers are whizzing and whirring away, testing hundreds of resource combinations to find the mix that adds up to the most reliable and affordable package of power the Northwest can buy. At this stage, everything is still awaiting decisions. A draft plan for public review will be out soon. Comment on the draft will be taken for at least 60 days. The final plan is scheduled for adoption in December or early in 1991.

This issue's cover was illustrated by Eugene, Oregon, artist Joan Barbour.

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SHAPING THE NEW POWER PLAN

Crafting the most critical components- the resource portfolio and Action Plan.

by Dulcy Mahar

There are some people in the Northwest who take the view that the Northwest Power Planning

Illustration by Lyn Nance

Council is about to come out with its first power plan. There is some merit to that view.

The Council's first two plans, published in 1983 and 1986, came out during periods of considerable electricity surplus. "Those plans weren't acquisition oriented, and that was appropriate," according to Council Chairman Tom Trulove. "The short-term focus was on managing the surplus. The only immediate actions to acquire resources were limited to capturing what otherwise would have been lost opportunities and laying the groundwork for acquisitions.

"In those two previous processes, we learned how to do a plan. Now the challenge—for the region as well as the Council—is how to implement a plan," Trulove said.

Times are different now. The region no longer has an electricity surplus, and—at least at present—its economy is expanding at a healthy rate. This growth, while welcome, poses its own challenges. Continued expansion will require new supplies of electricity. Now that the region's cheap hydropower base—which still supplies 75 percent of the region's power—is close to its maximum development, new electricity must come from more expensive resources.

And all new resources raise at least some questions. What are realistic levels for achieving conservation in a society that puts priority on voluntary implementation? Are alternative sources of renewable energy technically and economically feasible in sufficient quantities to make a difference? How does one quantify the environmental effects of various generating plants, such as those fueled with coal? Even if all other barriers were removed, what is the political reality of completing two unfinished nuclear projects? And a crucial question: what additional amount is the region willing to pay to minimize actual and potential environmental impacts—assuming that everyone could even agree first on what those impacts are.

The challenge, for the region as well as the Council, is how to implement a plan.

Not all the questions revolve around new resources. Growth in demand also comes at a time when developments have cast doubt about the continued reliability of some existing resources.

For example, unless a new agreement is reached, approximately 600 megawatts of hydropower will revert to Canada in the next decade as an agreement expires. (See related story: A Gathering of Authorities.) Voters in Oregon have again secured enough signatures to put a proposal to close the state's only nuclear plant on the ballot.

There is also talk of invoking the provisions of the Endangered Species Act to protect several species of Columbia River fish. Any resultant changes in the operation of the region's dams could affect the amount of hydropower available.

There are other changes, many that will benefit the region and some that will pose completely new challenges. (See: 14 things that have changed.)

Refining a resource portfolio

As a result of analysis and public comment over the past year, the Council now has the best information available on what new resources are available and at what costs. The focus since spring has been on the two most important sections of the new power plan: the resource portfolio and the Action Plan. Both will form the basis of a draft plan that will be available for public review.

Once available resources are known, the questions come down to which will the region use, in what mix and when. The answer—the mix and sequence—is what is known as the resource portfolio. That mix has to balance several considerations. The mix has to be best, not just in terms of costs to build and operate resources, but in terms of environmental impacts and of risk.

Risk management is one of those essential components that doesn't get much publicity, perhaps because it is a judgment call rather than a piece of data that can be computed mathematically. Risk involves such questions as what level of forecast energy need should the region build to, how much should the region be willing to rely on the economy energy market* (a resource over which there is little control), and what trade-offs should the region make in terms of cost versus reliability.

The questions come down to how much risk is acceptable. "There are risks to the power system as well as to the environment," Ed Sheets, the Council's executive director pointed out. "Coal plants may appear to be cheaper than some renewables today, but if the region were to spend large sums of money to build coal plants, what is the risk down the road of new regulatory and new scientific developments that could substantially reduce their production or increase their costs? The Council has to assess the risk of that happening as well," he added.

"Sensitivity" runs help answer the "what if"

Months of analysis go into shaping the resource portfolio. Much of this time is spent on "sensitivity" runs. These are studies that simulate the future operation of the power system. They can tell the Council how sensitive, in terms of cost, the overall power system is to individual resource decisions.

What is the region willing to pay to minimize actual and potential environmental impacts?

These sensitivity studies include such things as looking at the effects of accelerated schedules for bringing conservation online, the effects of changing assumptions about the availability of two mothballed nuclear projects, of adding 1,000 megawatts of geothermal or wind resources, and of adding solar devices in combination with combustion turbines. The studies are also being used to examine the cost impacts of mitigating global warming, the impact of uncertainty about cogeneration and the effects of uncertainties about coal and natural gas prices.

"We start with the lowest cost mix," Sheets explained, "and then we ask a lot of 'what if' questions. What if the conservation level that we now assume we can reach were lower? What would that do to the system? What if a large existing base resource, such as a nuclear plant, were to be taken out of commission? We have to look at each variable and ask what difference does that make to the big picture. Some things will make a big difference; others will have almost no effect in the grand scheme of things."

Answers to those questions can help the Council make important policy decisions. For example, if a sensitivity run indicates that putting a renewable resource ahead of a coal plant has very little overall cost impact, then the Council may decide to do so. But if the cost impact is large, the Council must balance its obligation to the environment with its obligation to ensure an economical and reliable electricity supply. Just where the compromise falls will be a judgment call, and no computer can do that.

"The computer allows us to simulate what might happen in the future, but it's not making any decisions. The model won't tell you how to value different risks. It can't tell you how to make trade-offs," Sheets explained.

Making those trade-offs has been the focus of the Council's recent work as it shaped the resource portfolio and Action Plan.

---

* Economy energy refers to energy that is available on the spot market, sometimes on an hour-to-hour basis. It may include surplus generation within the region or purchases from other regions. Since there's no way of knowing precisely how much and when this power is available, it hasn't been counted on to meet firm or guaranteed loads.

The Action Plan is the key component

Sensitivity studies are one piece of the analysis that is helping the Council evaluate policy options for its Action Plan. When finalized, the resource portfolio will provide a blueprint for the region, indicating a direction and schedule for meeting growth in demand for electricity. The Action Plan, by far the most critical component of the power plan, will tell the region what it needs to do right now and in the next five years to meet immediate resource needs and begin preparing for future needs.

One thing that has concerned the Council about previous plans is that the region seemed to focus on the resource portfolio, rather than on the critical short-term actions delineated in the Action Plan. The Council is considering packaging the plan in a new format to emphasize the importance of the Action Plan.

> **The questions come down to how much risk is acceptable.**

The portfolio is only a snapshot of the moment. It identifies what would be developed if all resources had to be acquired right now. Fortunately, they don't. The Council anticipates that other, better and cheaper resources will be available as technologies improve and developers come up with innovative solutions. The main purpose of the portfolio is to provide a measurement against which all emerging resources must compete. The Action Plan—not the resource portfolio of the moment—is what will determine the resources of the next century.

In the draft stages, the broad goal of the Action Plan is to enable the region to meet electricity demand through the next decade without bringing new, large, central station coal and nuclear plants on-line. Last May, the Council discussed this goal in the first of a series of public meetings to address the Action Plan.

14 things that have changed since the first two power plans

☐ The stagnant Northwest economy of the early 1980s has given way to regionwide, although uneven, growth. As a result, an electricity surplus that stood at about 2,500 megawatts in 1986 has been exhausted.

☐ The economy energy market* appears to be broader than previously anticipated and could in part provide a safety net for the region if new resources are not built in time to meet load growth.

☐ World oil prices, which influence demand for other fuels, plummeted in early 1986, just after the last power plan had been completed.

☐ Increased environmental awareness has led to growing concerns about large fossil-fuel burning operations, such as coal plants, which emit carbon dioxide.

☐ Conservation is now widely accepted as an energy resource, and all four Northwest states, most particularly Washington, have strengthened building codes or practices. All the region's utilities now promote energy efficiency through practical programs and incentives.

☐ Utility commissions in Idaho, Oregon and Washington now require utilities to submit least-cost plans patterned on the Council's power plan. Montana Power Company is also preparing a plan voluntarily.

Jim Litchfield, the Council's power planning director, said, "The proposed goal emphasizes the need to acquire cost-effective conservation and renewables during the 1990s. If we experience medium levels of growth, these two high priority resources will meet the region's needs through 2000. If loads grow more quickly, however, the region will need to turn to other resource alternatives. So the goal also includes the need to back up the region's electric power system with efforts to confirm the viability of other resource options."

To this end, the first objective proposed for the Action Plan calls for actions to develop conservation and efficiency improvements in the existing system to meet mid-level load growth through 2001. A second objective proposes to have the ability to develop sufficient renewable and high-efficiency generating resources to bring online if they are needed. A third objective of the Action Plan under consideration would be to see that the region is prepared to bring new central station thermal plants online after 2001, if higher load growth materializes.

Against these broad objectives, the Council is now focusing on specific steps to be taken to ensure the Northwest does indeed move into a secure energy future, one in which supply is met and at a cost that will jeopardize neither the environment nor the economy.

- ☐ A recovery in world aluminum prices put new life into the Northwest's sagging aluminum industry, reversing a trend of slowdowns and shutdowns among these energy-intensive companies.
- ☐ Some legal and financial barriers to completing two mothballed nuclear plants were removed as a result of a settlement and refinancing of bonds. But some institutional barriers remain (ownership for one), and other legal entanglements have arisen. The questions of practical shelf life and impacts of potential new regulation also remain.
- ☐ The Hanford Generating Project, a nuclear-fueled power plant in Washington, was shut down.
- ☐ Better data and newer technologies have brought some costs down and improved the chances that some alternative renewable resources could displace conventional thermal plants.
- ☐ More is now known about developable hydropower. A hydropower assessment study provided data on developable sites, and the completion of a protected areas process identified areas where development should be banned because of impacts on fish and wildlife.
- ☐ The utility community, as a whole, is undergoing changes in structure and in how it does business. Where once utilities developed their own generation, they are now beginning to seek bids for resources from independent power producers. There appears to be reluctance to investing in any large-scale, capital-intensive resources, even in the face of potential power deficits.
- ☐ The Bonneville Power Administration's role has been changing as the region becomes less centralized. Some public utilities have sought to become more independent of the federal agency, and Bonneville itself speaks more in terms of "partnership" than "leadership."
- ☐ The Council, whose very existence was questioned in a lawsuit in its earlier days, has become institutionalized. Its working relationship with Bonneville and other entities has evolved into recognizable patterns. The discussions now are far more likely to focus on issues rather than on the role or authority of the Council.

—DM

a Gathering of Authorities

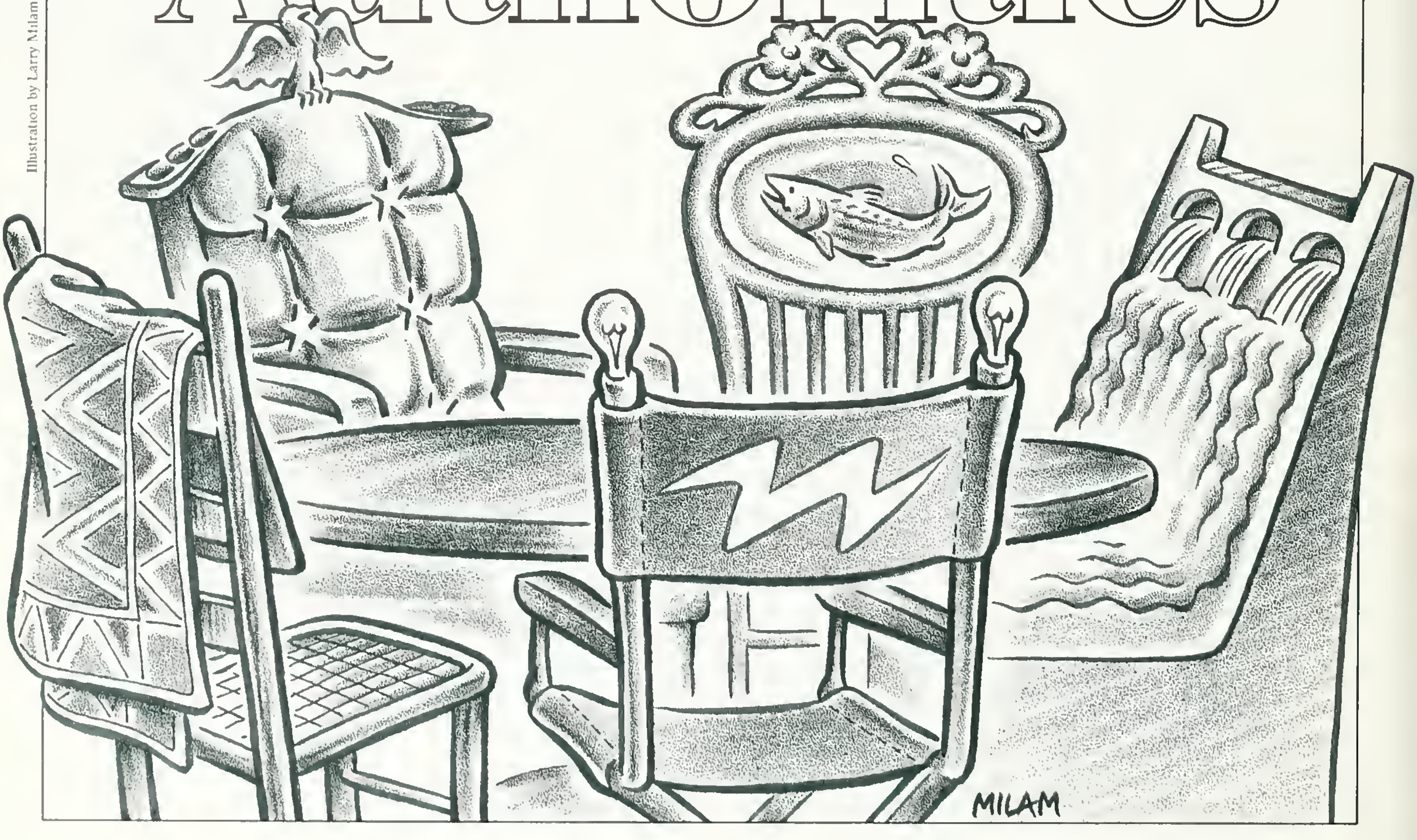


Illustration by Larry Milam

A broad review of the Columbia River system may redefine the roles of federal entities.

by Carlotta Collette

Three of the region's biggest power players, the Bonneville Power Administration, the U.S. Army Corps of Engineers and the Bureau of Reclamation, are having a kind of identity crisis. For the past 50 years or so, they have been running water through their various hydropower and irrigation projects, selling electricity and generally managing this country's most energy-productive system of dams. And while they carried on this business with the prerequisite public involvement, few Northwesterners could follow the complex intricacies of power wielding.

Then in 1980, a new law was passed by Congress, and the authorities of the big three seemed to shift. Unfamiliar faces appeared at the table when decisions were being made, and a freshly informed Northwest populace began a closer scrutiny of the river system. With the new law, came greater demands on the system.

The new law was the Northwest Power Act, signed in 1980. The Act called on Bonneville to undertake fish and wildlife recovery efforts along with finding and funding new sources for electricity. The Corps and the Bureau, along with the Federal Energy Regulatory Commission, were told in the Act to give equitable treatment to fish and wildlife, along with the other purposes for which the dams are operated.

For nearly 10 years, these agencies and others have struggled to balance power generation, flood control, recreation, irrigation, navigation and the provision of adequate water for young salmon and steelhead migrating through the system to the sea. But increasing energy use, the possible loss of power that returns to Canada starting in 1998 (see below), and expanding use of the river for recreation, irrigation and fish protection are prompting the three giant entities to re-evaluate their roles and the river operations they co-manage.

Demands on the river are tapping deeply into a finite resource. One of the world's biggest balancing acts may need to be more delicately calibrated than ever before.

The proposed "System Operation Review" coincides with the need to renegotiate several major management agreements between the United States and Canada and among Northwest entities. Perhaps the most significant of these agreements grew out of the U.S. and Canadian Columbia River Treaty, which was ratified in 1964.

The Columbia River Treaty was designed to share the costs and benefits of developing better flood control in the Columbia River system. Under the terms of the treaty, Canada built three storage dams (Mica, Keenlyside and Duncan) on the upper Columbia, and the United States built one, Libby Dam on the Kootenai River in northeastern Montana, to better regulate flows through the system.

In addition to flood control, the new dams enabled downstream projects in the United States to produce 2,800 additional megawatts of capacity (the maximum amount of power that can be generated by the system at a given time under specific conditions). Because it could not use even half of the new capacity and to obtain the capital to build its three dams, Canada sold its share of future power (known as the Canadian Entitlement) for 30 years, to a consortium of Northwest utilities doing business as the Columbia Storage Power Exchange. The agreement governing this exchange (the Columbia Storage and Power Exchange Agreement) begins to phase out in 1998.

One of the world's biggest balancing acts may need to be more delicately calibrated than ever before.

However, the Canadians have already announced that they intend to claim their power benefits (about 600 average megawatts) at the conclusion of the 30-year period. A new plan of operations must be developed by U.S. utilities to help the region adjust to the loss of power in 1998. This involves, on the U.S. side, another piece of the puzzle, the Canadian Entitlement Allocation Agreement, which describes the way the Canadian power is divided among Northwest utilities.

This agreement also expires with the Storage and Power Exchange Agreement, but it must be renegotiated by 1993 to facilitate planning for the new demands that will be put on the system when the Canadian Entitlement heads north.

To further complicate matters, yet another agreement comes up for re-examination this decade, the Pacific Northwest Coordination Agreement, which expires in 2003. This one was signed by the Corps, the Bureau, Bonneville and 15 non-federal generating utilities in the region. Its primary purpose is to coordinate power operations of the dams so the system is run as efficiently as possible. Non-power aspects of the dams' operations, such as irrigation withdrawals and flows for fish passage, were not affected by this agreement.

But non-power uses of the river will be carefully examined if one or more Columbia Basin salmon stocks are declared endangered, a possibility that is under review by the National Marine Fisheries Service. Such a designation could expose virtually every aspect of river operations to reappraisal.

All these converging events prompted the three federal agencies to call for a comprehensive public review of the entire system. They expect to take about three and a half years to study the legal, biological, ecological, environmental, economic, social, institutional and financial aspects of operations at all federal mainstem Columbia and Snake river dams.

They will be looking at each dam individually as well as at the interactions of all the dams in the system. They will be questioning and clarifying their own roles and the limits of their authorities. They will be proposing, testing and evaluating new ways to operate the system and new terms for the various agreements. Throughout the process, they will be refining the methods they use to engage the attention of the public.

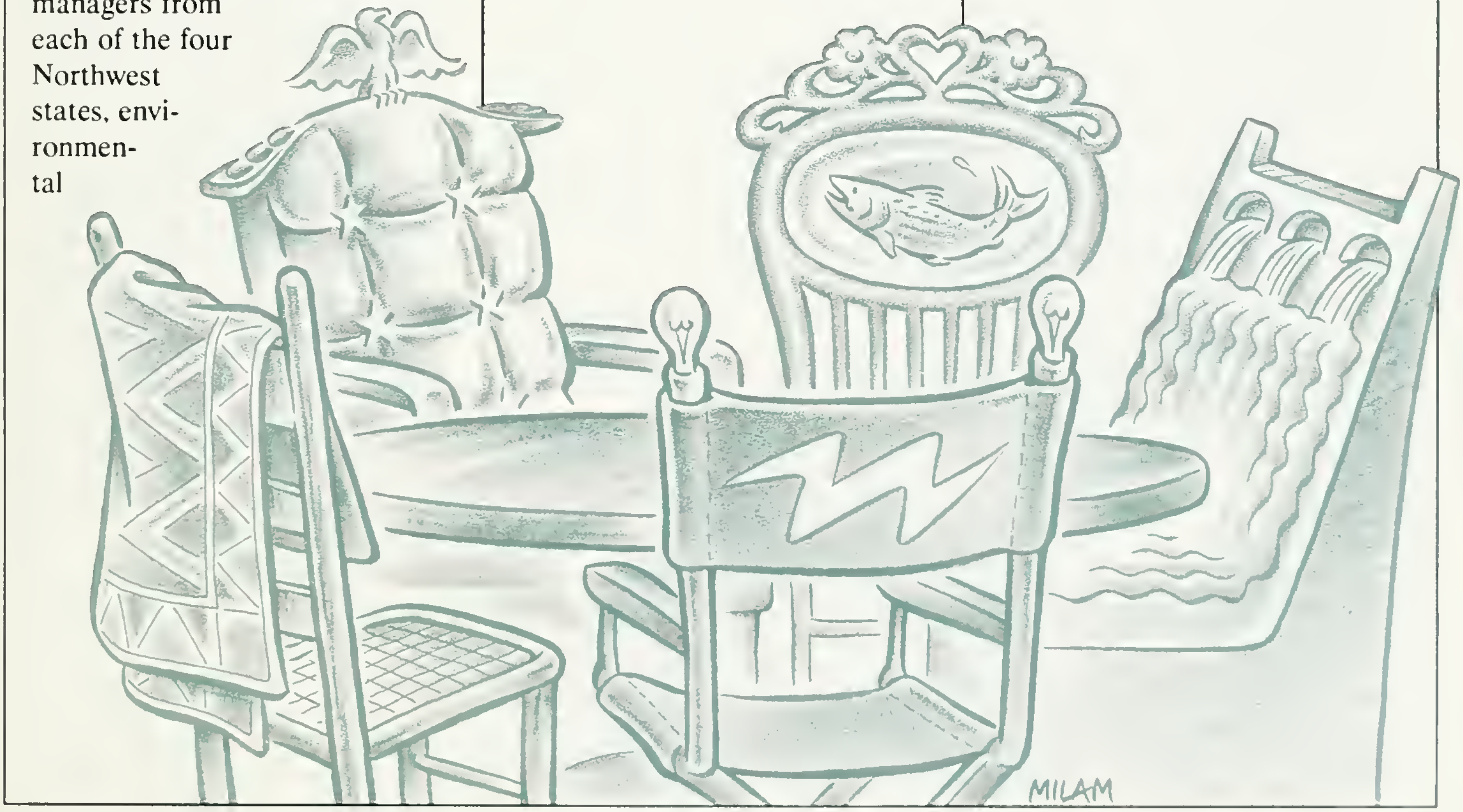
This planned review is big. Out of it will come a host of products: a report documenting the review; a long-term plan of operations based on the review's findings; an environmental impact statement regarding the new system plan; improved public involvement processes for these exercises; clarification of the criteria used to make operating decisions at the dams; and new agreements to replace the Pacific Northwest Coordination Agreement and the Canadian Entitlement Allocation Agreement.

The three agencies kicked off the process last fall by convening a "joint Columbia River consultation group" that includes representatives from several dozen organizations that have vested interests in the system. Fisheries managers, the tribes, utilities that serve large irrigation loads, industrial power users, water resource managers from each of the four Northwest states, environmental interests and others were brought together to hear the big three describe their proposed undertaking.

The group has reconvened twice since then as the extent of the project became more clear. Now the three agencies are calling for help to define the perimeters of the effort. Throughout the summer and the coming year, they will be running computer models to simulate the trade-offs of power benefits for non-power ones. Increasing flows for fish will be tested against the consequent loss of power generation, for example.

At the same time, they will be seeking the advice of their consultation group to help determine how broad and detailed the environmental impact study should be. Negotiations with the Canadians and within the region over the Canadian Entitlement power and the overall dam coordination process will be concurrent.

All new agreements and reviews are scheduled to be concluded in late 1993. What the federal agencies have called a "wholistic treatment of issues" will have been folded into "procedural clarity and certainty." If they meet their goal, the breadth and limitations of the three federal agencies' authority over the Columbia will have been written down in a single book. ■



Mark CRISSON

with Dulcy Mahar

How one public utility, Tacoma City Light, is facing the future.

For Mark Crisson, the adage "you can't go home again" doesn't ring true. He's serving his second stint at Tacoma City Light, and a separation of several years in the industrial sector doesn't seem to have hurt his career with one of the region's largest public utilities.

As superintendent of the Light Division (Tacoma Public Utilities also has a Water Division and Belt Line Railway Division), Crisson is responsible for managing the city's electrical utility. Perhaps more than any other utility, Tacoma embodies the dichotomy between independent resource development and reliance on the Bonneville Power Administration (BPA). Its power needs are met nearly equally from its own resources and from the regional power marketer.

Crisson began his career with Tacoma City Light after graduating from the U.S. Naval Academy and a five–year tour of service with the nuclear submarine forces. (Yes, he liked "Hunt for Red October" and, except for minor quibbles, thought it was fairly accurate.) He started out as an electrical engineer with the utility and was assistant power manager by 1983.

That year, he left the utility to take a position with Martin Marietta, an aluminum producer, as the company's Northwest power manager. Two years later, he moved on to head Direct Service Industries Inc., a group of industries (primarily aluminum smelters) that purchase power directly from Bonneville. Then in 1987, he came home again to Tacoma as the utility's superintendent.

Although he downplays his role, Crisson was a key player in forging a utility consensus that helped bring about a new Washington state building code that embodies the Northwest Power Planning Council's model conservation standards. In that respect, he continues a long and strong conservation leadership tradition for Tacoma, the first city to adopt the standards.

Q. When the Northwest had surplus electricity, yours was one of the few utilities still actively working to develop new resources. Why? What was your experience, and what direction are you headed in now?

We looked at a lot of different resources during the surplus, but primarily at small hydroelectric projects. This was largely motivated by the BPA rate increases we experienced from 1979 to 1985. When I came into my current job, my perception was that our basket overflowed. We had too many projects and weren't being discriminating enough either in an environmental or an economic sense.

We were on the verge of undertaking enterprises that we weren't very well equipped to manage. So we focused on doing a couple of things. One was getting potential resources down to a more manageable and more selective group. Second was to try to build public awareness and support for what we were doing.

I think we've essentially done both. We've taken our hydro portfolio down to about a half a dozen projects that I think are much more environmentally acceptable and that are the best economically. I feel good about that.

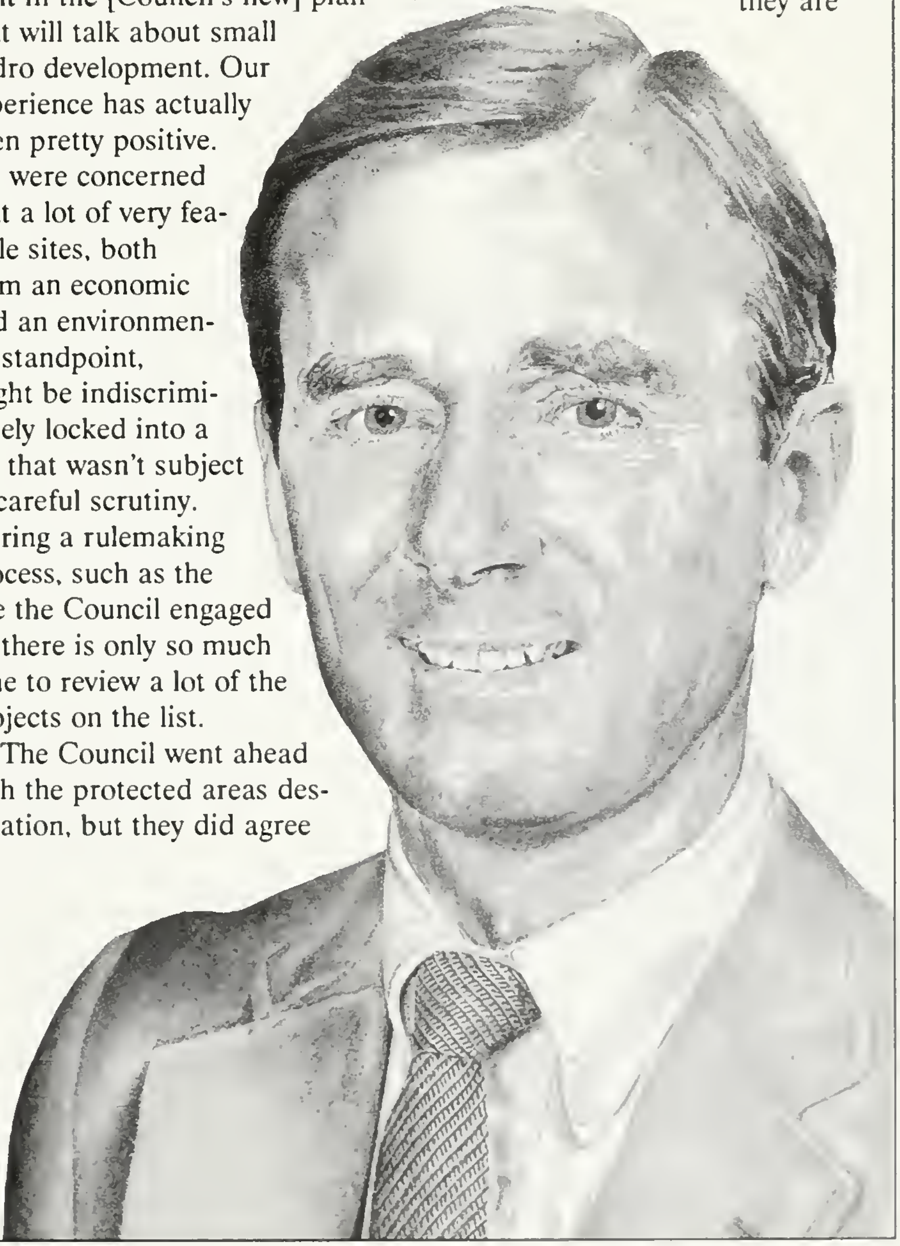
We've also completed our first least-cost plan. It's in a draft stage—out for public comment right now—and it reflects those changes.

Q. When you were looking at some hydro development, you ran up against the Council's protected areas process, and I know you found that somewhat frustrating. Do you see positive sides to the protected areas designations? Are there ways that, for example, utilities can use them to focus hydro development in areas that aren't problem areas?

Yes, although it may be a little early to say on a regional basis how well it will work. I assume there will be a significant component in the [Council's new] plan that will talk about small hydro development. Our experience has actually been pretty positive. We were concerned that a lot of very feasible sites, both from an economic and an environmental standpoint, might be indiscriminately locked into a list that wasn't subject to careful scrutiny. During a rulemaking process, such as the one the Council engaged in, there is only so much time to review a lot of the projects on the list.

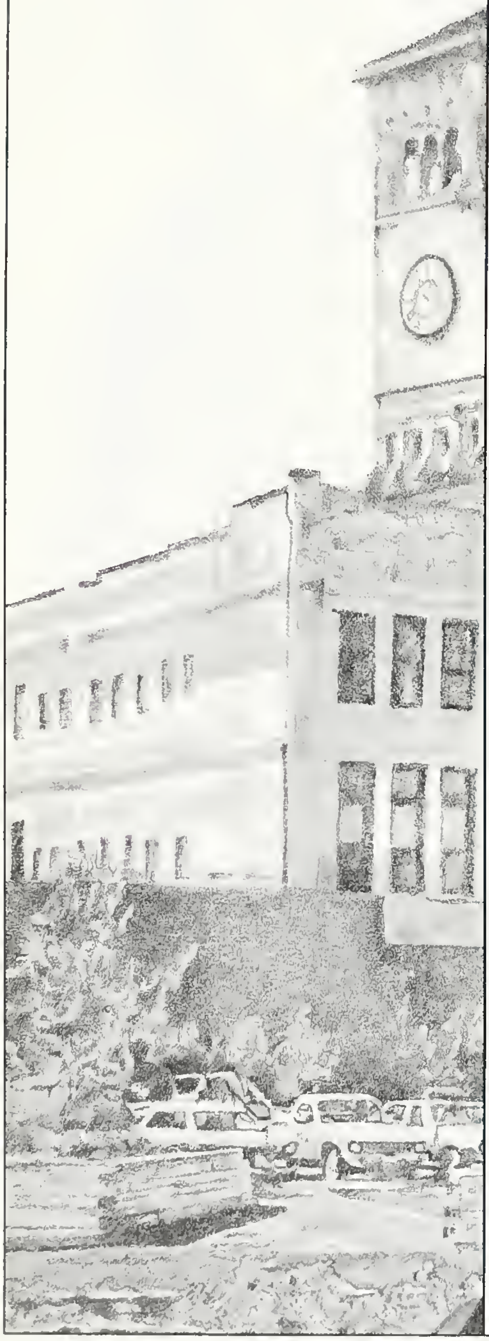
The Council went ahead with the protected areas designation, but they did agree to a process whereby projects could be reviewed, and we've exercised that process with two projects. There were questions about a couple of projects in the Nooksack Basin that had been designated as protected, and we looked into it and found out that the basis for the designations was very weak.

We pre-sented that information to the Council under the process identified in protected areas, and with the support of state agencies and concurrence with the Council, have had [protected status] removed. So they look like they are



Portrait by Lynn Carson

I see a growing support for the need to get on with conservation programs.



potential sites for development now. That was encouraging. What it told us was, "Yes there's a protected areas designation, but if you can make a strong case that an area should be modified or removed in some way, there is a process for consideration."

Q. Now that the region is at load/resource balance, or possibly even deficit, what directions do you see utilities taking?

Well, I think there's an emerging consensus that BPA and the region's utilities need to be working together to address future resource needs. The discussion surrounding the Council's formulation of the regional plan will be an important part of where the region goes. To me, there are varying degrees of uncertainty about different parts of that potential plan. I see, for instance, a growing recognition and support for the need to get on with conservation programs and increased levels in conservation activity. That's been reflected in Bonneville's projected program levels for the coming years. I think that's a very positive development.

Still, some issues surround conservation. What's the most efficient delivery mechanism, for example? Everyone agrees the greatest potential is in the commercial and industrial sector, and yet we haven't really established a lot of experience in that sector. So there's some work to be done to establish the most effective way to get the most amount of conservation for the least investment.

Q. What do you think about Bonneville's new acquisition proposals that essentially give utilities more independence by decentralizing conservation programs?

While I'm not familiar with the details, in general, I favor the notion of allowing utilities to interact with their own customers and contribute to the conservation effort through programs of their own design. Decentralizing and taking advantage of the experience that a number of utility staffs have gained over the last decade is just smart, and we support that. But again, whether it's a central or decentralized program, I think there's still some question of the most efficient way to deliver the conservation.

Q. What do you see as the appropriate role for Bonneville during the coming decade? I ask that because Tacoma seems to have taken a path toward independence from Bonneville. Is that a fair characterization?

In the past, it probably was a fair characterization. We're reviewing that right now as part of our resource planning. A more accurate statement of our current resource development policy is to try to meet all or a significant portion of our projected load growth over the next decade or two in such a way that we basically maintain our current level of reliance on Bonneville.

I don't think it's either realistic or desirable, frankly, for Tacoma to try to become independent of BPA, given our current situation, which is that we rely on BPA for roughly 40 to 45 percent of our energy supply.

I feel very good about our relationship with Bonneville right now. I would like to see the partnership concept continue to evolve, and I'm encouraged by some of the preliminary developments along those lines. Bonneville has been receptive to our comment and others' comments regarding the need for increased conservation levels. They've also been responsive to suggestions about delivery mechanisms for both conservation and generating resources.

It's difficult for Bonneville to be all things to all people, and I think they try to be as responsive as they can. But that's not the easiest thing to do. I would like them to try to find a way to be responsive in a more timely fashion. We recognize they're a federal agency, that they are process oriented, and that public process is a good thing. But we're also looking at a situation in the region where the recent load growth is well above projections.

I can see some real benefit to trying to recapture a lot of the cooperation that was the rule rather than the exception before the surplus. We, the members of the utility community, have initiated some discussions with Bonneville to try to do just that. We see some encouraging signs of that, both in our discussions at staff level and things like Bonneville being able to settle this WNP-1 [Washington Public Power Supply System nuclear project at Satsop] dispute here a few months ago. It was a compromise. It was encouraging.

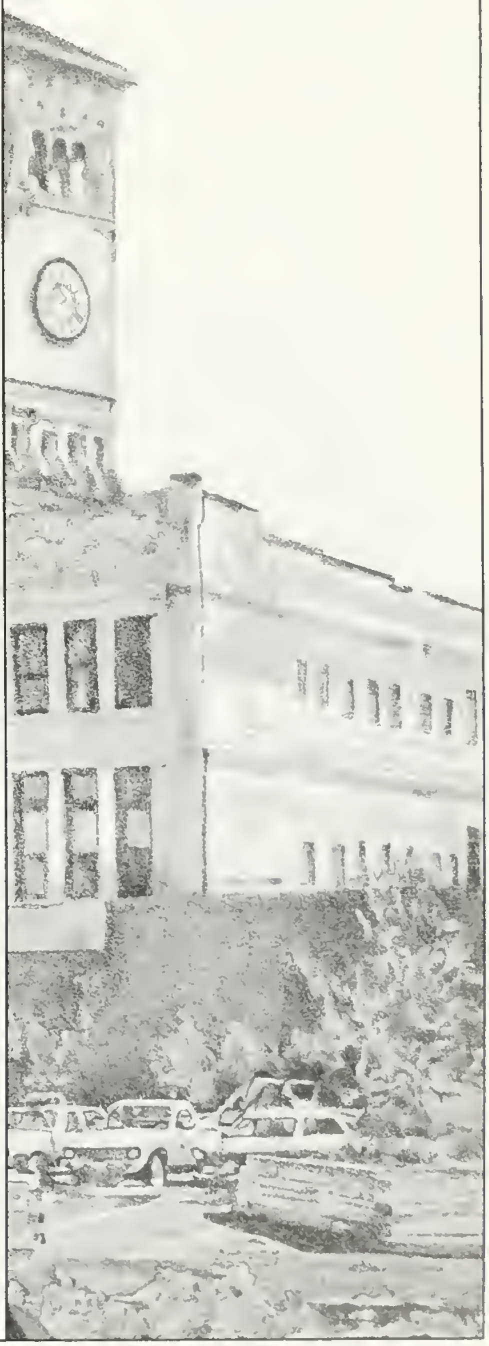
Q. West of the Cascades, utilities have been urging Bonneville to step up funding for conservation programs, but public utilities on the east side of the region appear to want to put a lid on conservation spending. Is there a split among public utilities?

I think there has been a difference in philosophy. Bonneville's doing a good job trying to reconcile the differences in views. My feeling is that if the resources are needed by the region, whether it's conservation or generation, Bonneville ought to pursue the most cost-effective available alternatives. It only makes sense to pursue conservation where you're having your highest amount of load growth. Currently that's in the Puget Sound, but there's also potential in other parts of the Bonneville service area. Frankly, I'm a little puzzled by the polarization that's occurred.

One of the things that contributes to this is that, while a lot of us are saying that we recognize there's a need for resources and we're in load/resource balance, it hasn't always translated into noticeable support for the programs necessary to meet load growth. It hasn't translated to a recognition that there may be, very likely will be, an impact on the bottom line for Bonneville's costs. It's a cost associated with meeting growth.

The issue of how the costs are allocated to meet that growth was addressed in part in the regional [Northwest Power] Act and can be addressed in part in the future as Bonneville decides how, for example, conservation programs are funded. I'm concerned that the

Bonneville ought to pursue the most cost–effective available alternatives.



While a lot of us recognize there's a need for resources, it hasn't always translated into noticeable support for the programs necessary to meet load growth.

debate not deter Bonneville and the region from proceeding on a timely basis to seize conservation opportunities.

I think part of the difference in philosophies between eastside and westside utilities is that westside utilities tend to view conservation programs as strategies for coping with growth. I'm not sure that's shared completely by other utilities. I hope that in the future it becomes more and more the prevailing view. That will facilitate regional agreement in how we proceed.

Q. How do you perceive the Council's power planning process so far? Do you feel utilities have been involved? Is the new plan going to be worthwhile to them?

Yes, I think so. This Power Council is very open, very accessible. It's making a real effort to get out to consult directly with utilities or utility groups. There's a general recognition that this plan can really make a difference, because it could provide a blueprint for how we proceed with actually developing resources.

I think the Council is doing a thorough job not only analyzing the alternatives with the staff—which is very capable—but making sure they talk to everybody. That has to go beyond just the input they take at Council meetings, and it would appear there's a recognition of that. There appears to be a very positive outreach effort going on right now to come and meet all of us, and not just on their turf, but on our turf.

I think this discussion represents growth on the part of both the industry and the Council. We've learned more about some of the realities the Council has to deal with in today's environment. Similarly, the Council's learned more about some of the real world concerns utilities have—meeting load, satisfying customer needs, the reality of actually having to develop a resource and all that entails.

I was very encouraged to hear, for example, that one of the Council members met recently with some state agencies to talk about their concerns related to small hydro development in Washington. I'm not sure what came out of that meeting, but just the fact that he took the time to do it, I thought, was significant. What that tells me is they're willing to take a proactive role to try to see some of the things in their plan actually come to fruition. And I think they're in a unique position to do that.

The Council is viewed, and I think rightly so, as objective and credible and trying to balance competing concerns. They can play a very helpful role in seeing that some of the things in the plan are more than just resources on paper.

Q. What would you like to see in the new power plan?

I think one of the concerns a lot of us have is the region's ability to develop necessary resources in a timely manner. Maybe I'm just more sensitive to it, being a westside utility, but we've been looking at rates of growth recently that are quite a bit higher than most forecasts have been predicting long term. Maybe that trend will continue, maybe it won't, but if it does, we're looking at needs for additional resources early in this decade. And given the lead time, the licensing, siting, permitting requirements for most resources, *that* presents a real problem.

So while I think the Council's plan ought to look down the road and be long term, I see the need for a near-term component as well. I would like to see that addressed as part of the plan, a recognition that there may be some hard decisions, some tough steps to be taken, hopefully in concert—utilities, Bonneville, the Council—to meet that nearer-term need should it materialize.

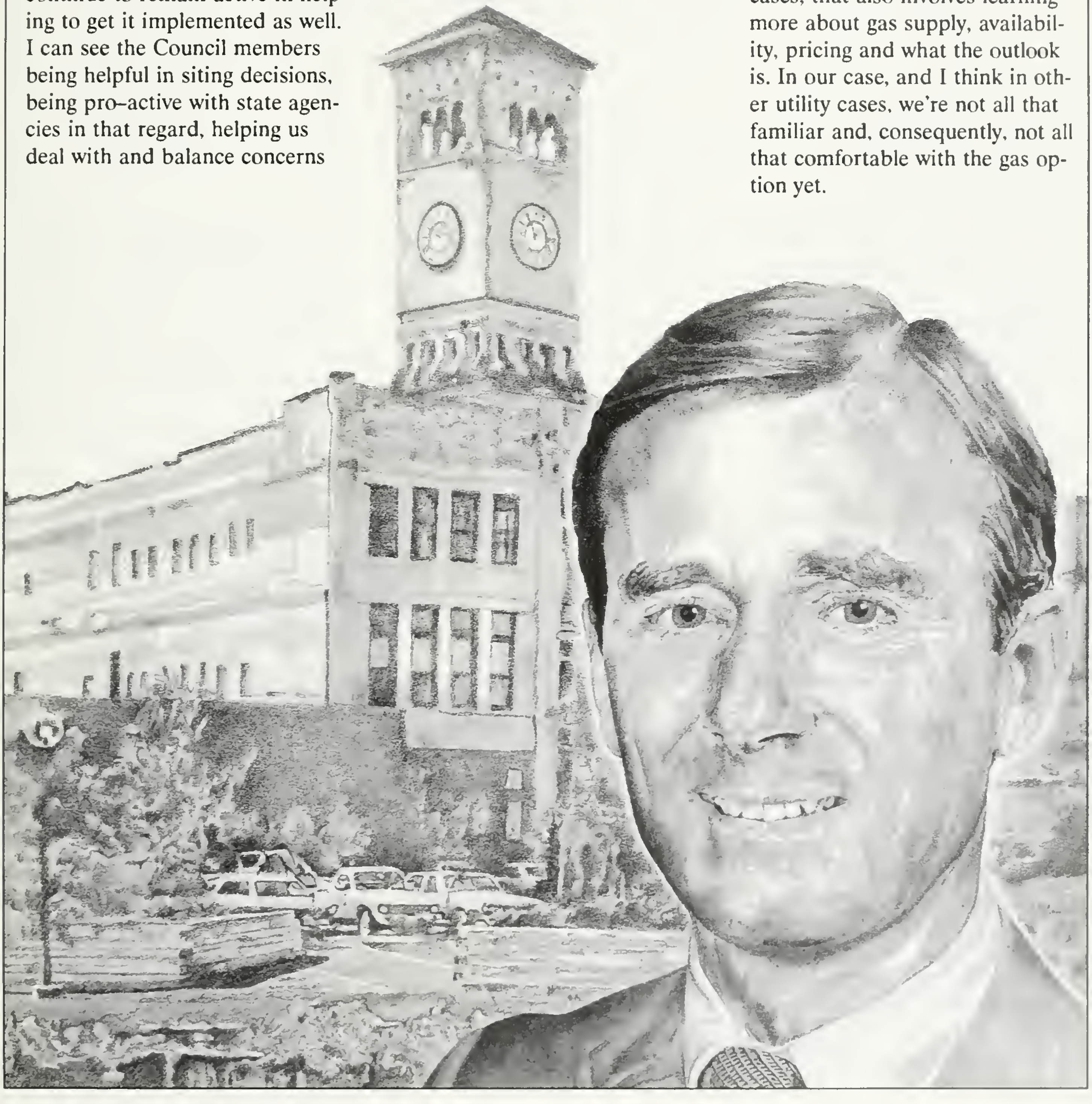
And if current trends continue much longer, it will.

Q. What do you see as the proper role for the Council in the coming decade?

Certainly a big part of the Council's role and responsibility is to put the plan together. I personally would like to see them continue to remain active in helping to get it implemented as well. I can see the Council members being helpful in siting decisions, being pro-active with state agencies in that regard, helping us deal with and balance concerns state agencies might have, whether it's in the small hydro area or cogeneration, or what have you. That's something that I know the utilities and Bonneville have focused on recently—not just what we do, but how do we get it done.

Q. Besides conservation, what kind of resources is Tacoma looking at?

Pretty much exclusively hydroelectric and some system efficiency improvements. We've identified in a recent survey and study significant cogeneration potential. We have a number of large industries in Tacoma, so we may be pursuing that as well. The cogeneration alternative is something we need to learn more about as a utility and as a region. In most cases, that also involves learning more about gas supply, availability, pricing and what the outlook is. In our case, and I think in other utility cases, we're not all that familiar and, consequently, not all that comfortable with the gas option yet.



Q. That issue has come up in connection with firming nonfirm power. [1]

I think there needs to be a recognition that firming nonfirm has potential and that there are costs as well as benefits there. We need to recognize that Bonneville and a lot of the region's utilities derive significant revenues right now from nonfirm sales, and that has to be factored into the cost of firming nonfirm.

There are questions that are yet to be resolved, or at least better answered, about the gas option. On the surface, however, it would appear that if we were talking about operating gas turbines a few weeks or months, as opposed to some base-load operation, that there's merit at least in exploring and considering it as part of the portfolio.

One of the things that ought to be said for gas is, if for some reason we the region or we the utility had to have some increment of new generation online in a relatively short period of time, I'm not sure what other option we would have. Siting decisions and lead times involved in permitting or licensing have become longer, not shorter. They're very involved. Something with a relatively short lead time to construct, such as a gas turbine, has some advantages.

Q. Do you think that the region's two mothballed nuclear plants [Washington Public Power Supply System nuclear projects 1 and 3] are viable options? Or are they a dead issue?

This Power Council is very open, very accessible.

I think WNP-1 and WNP-3 face a number of formidable roadblocks to completion. That stops short of saying they're dead resources. First, there would be a significant additional investment required to complete either one of the projects. The time involved to complete them exposes them to some additional regulatory risk, and the nagging question of long-term waste disposal for nuclear waste is still not resolved. That is a problem nationwide for the nuclear industry.

My perception is that nuclear simply doesn't enjoy a large degree of public confidence at this point. My personal feeling on this is that if the only voice of support for completing the nuclear plants is coming from the utility industry, it's not likely the plants can be completed. There needs to be a greater degree of public support from other sectors. There has to be, if not a consensus, at least a majority view on the part of a fairly diversified constituency that, while there may be some risks or costs involved with nuclear, the alternatives are less desirable.

Whether the alternatives are other forms of power generation or rotating blackouts, I don't know at this point. Maybe we have to get farther into a supply problem before that kind of a consensus emerges.

Q. What other issues do you see ahead for utilities in the '90s?

Given environmental concerns, this "NIMBY" [not in my backyard] phenomenon has become something that we have to deal with. It's probably at least in part a product of past sins, errors and omissions by industry—whether it's utility industry or other big business or government. You see a fairly deep-seated mistrust of government or large industry, combined with a very personal interest in what goes on in your own community and neighborhood.

I see a number of things that have to happen to deal with that, because I think it's going to be a major factor in the '90s, particularly if you talk about doing small projects, maybe some at the local level. That could involve the Council in a proactive manner. We will need somebody's views that are credible and objective, someone who can come in and say, "It [the project] does a good job of balancing a lot of competing concerns." That's not what you typically see in these cases. A NIMBY group just comes in and says, "No," instead of, "No, here's a better way."

As an industry, we have to work primarily at the local level to establish greater confidence and trust and comfort that what we're doing is balancing a number of concerns. That's going to be a challenge that I think is going to be part and parcel of developing resources in the future. ■

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[1] Firming nonfirm refers to backing up a portion of the additional hydropower available in wetter years, so it can be used to meet guaranteed power needs. Gas-fueled turbines are one alternative.

HYDRO *al Dente*

by Gordon Lee

Recipe for more firm hydropower without more water.

The recipe for squeezing more electricity from Pacific Northwest hydropower dams may involve drought–stricken California. It may also rely on windswept natural gas fields in the Rocky Mountain regions of the United States and Canada.

In the paradoxical recipe book of power planning, those locations may play a key role in stretching the Northwest's vast sources of hydroelectricity.

Power planners at the Northwest Power Planning Council calculate that the region may be able to obtain enough additional hydropower to light four cities the size of Portland, Oregon, without running more water through existing dams, changing their operations or building new dams.

Instead, that power could come from buying energy from California as a backup to the Northwest's hydropower system. It could come from using natural gas–fired turbines as a backup. Or it could come by encouraging some customers who use large amounts of electricity to use interruptible supplies rather than firm supplies whose delivery is guaranteed all the time.

These are among a number of strategies the region's utilities may use to stretch the firm supplies of power existing dams

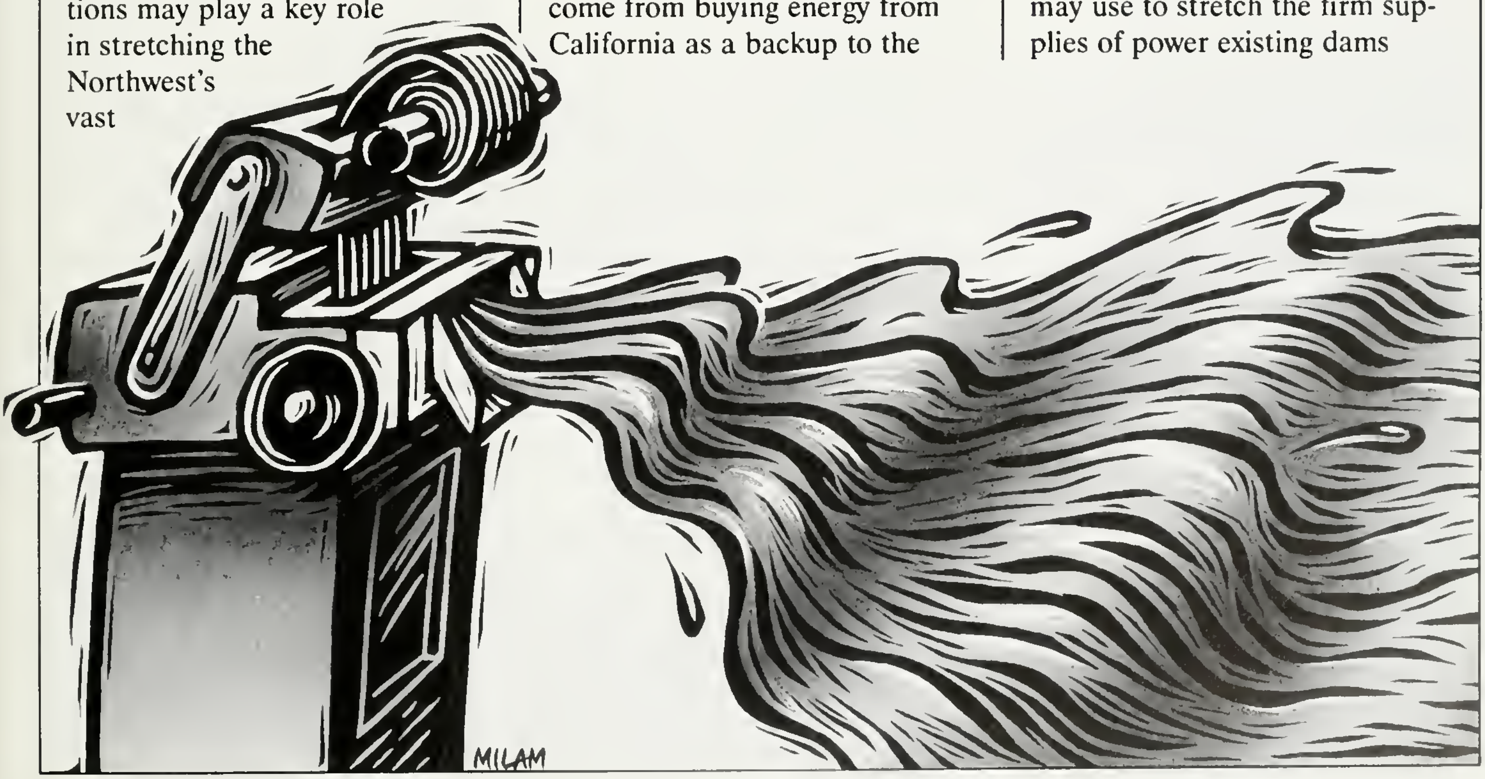


Illustration by Larry Milam

The recipe for squeezing more electricity from Pacific Northwest hydropower dams may involve drought–stricken California.

produce. Dubbed "nonfirm strategies" in planning lexicon, they likely will play a prominent role in the Council's new 20-year power plan for the Northwest. That plan will identify ways the region can address a possible power need that could reach 13,000 megawatts by 2010 under certain high-growth conditions.

All nonfirm strategies have the same goal: to transform what the region today considers secondary or surplus hydroelectricity—power that is available during normal, wet years, but not in dry ones—into firm supplies of power that utilities can guarantee to customers year in and year out.

None of that additional hydropower would come from running more water through the region's existing dams or from building new hydro facilities in the region.

"The key is we have a tremendous resource, the Columbia River System, that we should try to exploit fully," notes Ed Sheets, executive director of the Council. "Can we come up with strategies to better use nonfirm power?"

Hydropower is the dominant source of electricity in the region, supplying three of every four kilowatt-hours Northwesterners consume. But dams may be able to supply even more power. Power planners speculate the region hasn't fully exploited its existing hydropower network. New strategies may allow utilities and dam operators to squeeze more power from those facilities. Since existing hydropower dams are the least expensive source of energy in the region, any scheme to stretch the amount of firm power that dams already produce would help preserve the Northwest's low-cost energy base. That would spell good news for the region's electricity-dependent economy and way of life.

Hydropower's dominance has given the Northwest some of the lowest electric rates in the country. But at the same time, low-cost hydropower has made the region disproportionately vulnerable to jumps in the price of electricity. The region has the highest per-capita electric use in the country. Many Northwest residents have all-electric homes, and numerous electricity-intensive industries are located in the region.

Four years ago, in its 1986 Northwest Power Plan, the Council—a four-state body empowered by Congress to oversee the region's long-range utility planning—outlined strategies utilities could employ to wring an extra 700 megawatts of firm, guaranteed energy out of Columbia River hydropower dams. This energy—more than enough to power a city the size of Portland, Oregon—would cost less than power the region could obtain over the next 20 years from most new conventional coal plants.

That estimate may have been too low. Today, as the Council prepares a new regional power plan, its studies suggest that a variety of strategies could allow the region to guarantee an additional 1,000 megawatts from existing dams before the year 2000 and an another 1,500 megawatts by 2010.

Put another way, those strategies may allow the region's utilities to sell additional guaranteed supplies of hydropower from existing dams equal to the output of five newly built, large coal plants.

The Northwest's network of dams has the capacity to produce some 30,000 megawatts at times of peak demand. But the dams don't operate for long periods at that capacity, because they are constrained by the amount of water available at any given time.

As a result, the amount of hydropower the region can produce depends on the weather, on how much rain and snow falls during a given period. This means that utilities in the region can guarantee customers power only up to the point at which they're sure sufficient amounts of water will be available. They can't sell guaranteed supplies of power based on amounts of water they're not confident the region will receive year after year.

If utilities use too much water one year, they risk running short the next if precipitation is below normal. To reduce that risk, Northwest energy planners use a tool known as the "critical water standard" to calculate how much firm power dams can produce each year regardless of the weather.

Critical water refers to the amount of water the region would receive if it experiences a repeat of the driest years on record, which took place during 42 months in 1929–1932. Under those conditions, the region's dams could produce nearly 12,500 megawatts. Any energy dams generate above that level is nonfirm power, since its delivery can't be guaranteed year after year.

During average years, the region produces some 4,000 megawatts of nonfirm power, enough to supply four cities the size of Seattle. Because it's an unsteady source, that electricity can't power the region's firm needs, which include most residential, commercial and industrial uses. Instead, it's bought by aluminum companies for part of their loads, allowing them to run at fuller production; by utilities in the Northwest, allowing them to shut down expensive thermal power plants; and by utilities in California, allowing them also to displace more expensive thermal resources.

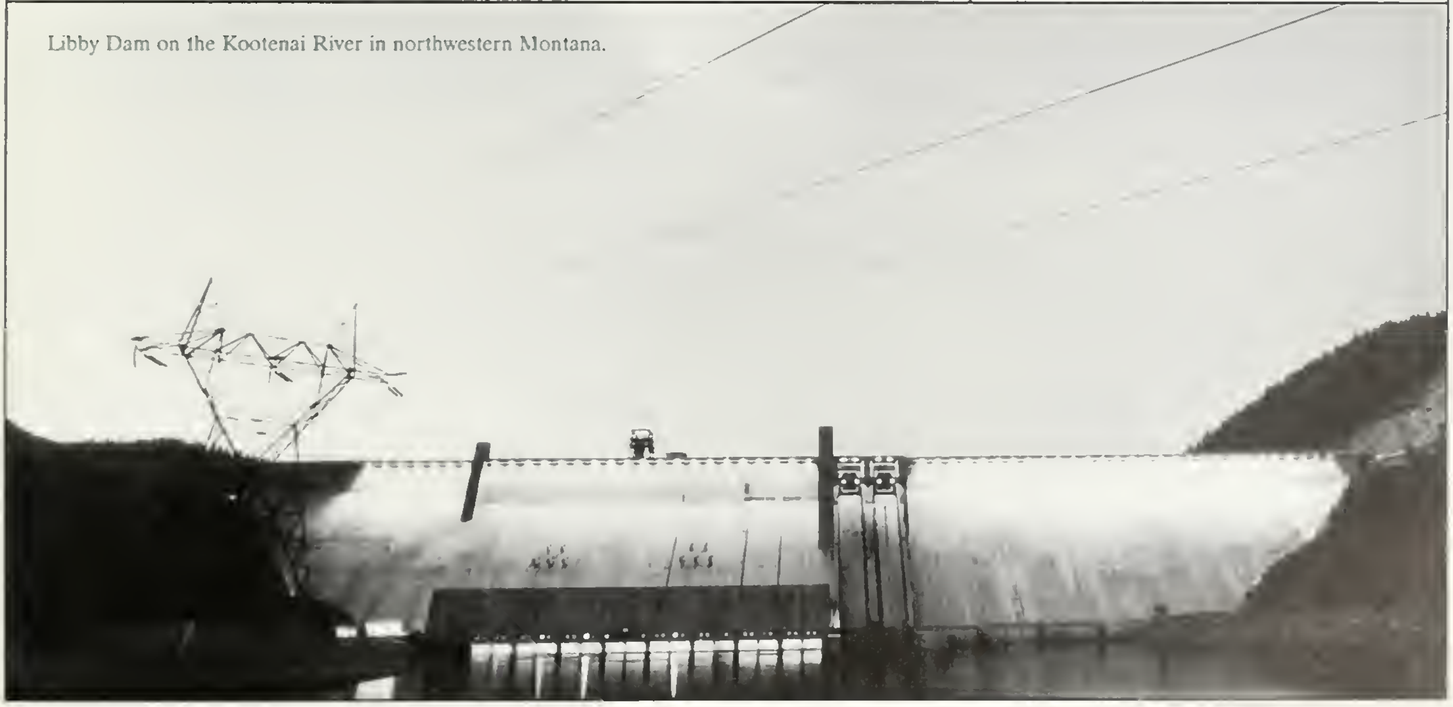
As the region's firm power needs grow, planners increasingly point to nonfirm power as a potential "new resource." If some of that power could be transformed into firm energy, the region would be able to exploit its cheapest resource—hydropower—without having to construct expensive new central generating facilities.

The Council has found that backing up hydropower with another resource to operate in poor water years would be one of the cheapest ways to meet growing firm energy loads.

In one sense, that's what the region has done for years, notes Tom Foley, conservation and resources manager in the Council's power planning division. In good water periods, the region's utilities have shut down expensive thermal plants, such as a large, coal-fired facility at Boardman, Oregon, or sold their output to California utilities, replacing even more costly power produced there. During dry years or peak demand periods, they've fired up those plants.

However, this may not be the most cost-effective future strategy, Foley says, particularly as the region's electricity surplus diminishes. That's because large central stations carry substantial capital and debt costs, regardless of whether they're operating. Other generating facilities with smaller fixed costs may be more economical, even with higher operating costs, if they operate sporadically. Moreover, with today's energy prices, California utilities can produce more power at lower cost than in the past, diminishing their demand for more expensive thermal power from the Northwest.

Combined-cycle combustion turbines may be one option. Similar to commercial jet airplane engines, combustion turbines run



Libby Dam on the Kootenai River in northwestern Montana.

Photo by U.S. Army Corps of Engineers

on natural gas or oil and can be linked to a generator to produce electricity. Combined–cycle units use the waste heat from an initial combustion turbine to run a second steam turbine. They are inexpensive to build, compared with coal or nuclear facilities, although their operating costs, which depend on gas prices, can be relatively costly.

They'd lie idle during wet years, only firing up in dry periods or when power operators are unsure that reservoirs will refill. Between 60 percent and 70 percent of the time they'd not be used, according to recent Council estimates.

However, at least one gas utility observer suggests that estimate may be high. "It has been difficult for us to get an idea of how combustion turbines would really be used," says Dwayne Foley [no relation to the Council's Tom Foley], vice president of gas supply and pipeline relations at Northwest Natural Gas Company in Portland. "Once you've built $500 million worth of combustion turbines, the owners will have an extraordinary temptation to use them. If you're running your operations on incremental economics, you'll run quite a bit of the time."

At current and projected natural gas prices, the Council figures that a network of combustion turbines could allow the region to produce an additional 1,000 megawatts of firm hydropower by the year 2000 and another 1,500 megawatts by 2010. That power would cost less than energy from most conventional coal plants the region's utilities could build to obtain the same amount of electricity.

During average years, the region produces some 4,000 megawatts of nonfirm power, enough to supply four cities the size of Seattle.

Other strategies may be cheaper still. Power may be available in a number of markets in California and the Desert Southwest. For example, California utilities have some 15,000 megawatts of gas–fired capacity installed today, a large portion of which is near retirement. Rather than build turbines in the Northwest, it may be cost–effective for the Bonneville Power Administration or the region's utilities to keep those California plants in running order to use as backup, the Council's Foley notes.

Moreover, new cogeneration facilities in California that produce electricity as a by–product of other industrial efforts may have power to sell. "We know that, because of the construction of a lot of cogeneration plants, there will be a lot of facilities that run 24 hours a day in California," notes Sheets. "Could we buy cogeneration power during the off–peak hours to let our reservoirs fill during dry years?"

Closer to home, industries that today consume firm power may be willing to use interruptible supplies, thereby shaving the region's demand for guaranteed electricity. Getting them to switch also may be cheaper than obtaining the same amount of power from new coal plants.

Some or all of these strategies may prove to be economical, says Sheets. "Let's keep our eye on the big picture. We have inexpensive nonfirm power that should be backed up so we can count on extra power all the time. Combined–cycle combustion turbines are just one way to do this. They are just one of an array of options the Northwest could turn to."

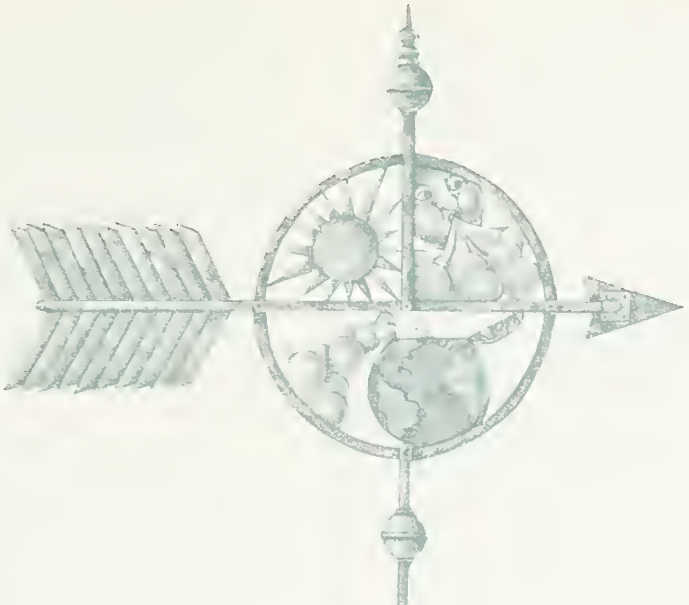


Illustration by Joan Barbour

TAKING A READING ON RENEWABLES

by Ruth L. Curtis

Solar, geothermal and wind resources need testing.

Geothermal, wind and solar energy are among the Northwest's most promising new renewable resources, but their future is obscured by technical, environmental and institutional clouds. So how does the Northwest clear the view and ensure that the region has the expertise to develop these resources when they are needed? This is one of the issues the Northwest Power Planning Council is wrestling with this year as it develops a new 20-year electric power plan for the region.

These renewable resources are attractive because they are just that—renewable. They don't depend on ever-decreasing supplies of oil, gas or coal. Their fuel is

> **Power from geothermal and wind sources, and possibly from solar, could be needed within the next 20 years.**

fundamentally free—sunlight, hot underground water and wind. And they usually come with significantly fewer social and environmental drawbacks than other sources of electricity.

What has slowed their development in the Northwest is their cost, relative to other power resources and the past decade's surplus of electricity. But technological refinements have decreased their costs in recent years and improved their reliability, making them increasingly attractive at a time when new resources are likely to be needed.

The Council's studies in preparation for the new power plan have concluded that power from geothermal and wind sources, and possibly from solar, could be needed within the next 20 years if the Northwest continues to grow at or near its current pace. But until the availability of these resources is confirmed by practical demonstrations, an accurate reading of how much the Northwest can expect from these sources remains nebulous.

Over the past year, the Council's Research, Development and Demonstration (RD&D) Advisory Committee has been evaluating renewable resources and developing plans to help make the resources available to the region. The committee includes representatives from government agencies, utilities and renewable resource companies.

This spring, the committee proposed strategies for testing geothermal, wind and solar resources. These strategies were compiled and released as a Council issue paper (publication #90-5). Fine tuned by public comment and Council discussion, these strategies, or "confirmation agendas," will likely be included in the draft power plan. Other renewable resources are also being examined, but these three—geothermal, wind and solar—are being looked at first, because they have the greatest potential to offer the Northwest, and they are closer to being viable power generating resources.

Geothermal

Geothermal power—using naturally occurring underground hot water to make steam that drives turbines to produce electricity—is not the exotic technology that it once was thought to be. Throughout the world, there are more than 200 plants online, generating enough electricity—about 5,400 megawatts—to power more than five Seattles. These plants are proving that geothermal electricity can be reliable and cost-effective.

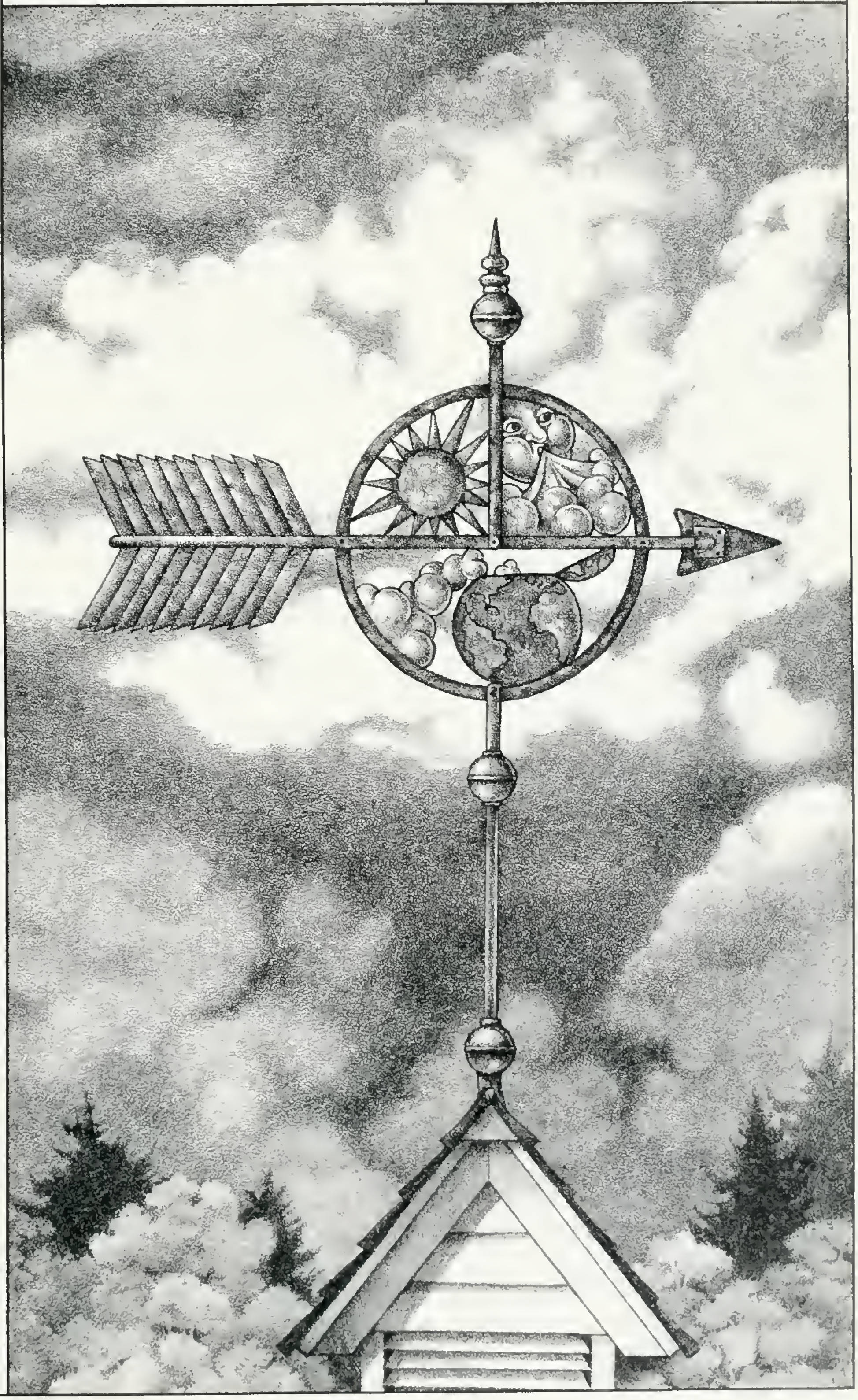
However, in the Pacific Northwest, the power surplus of the 1980s and low electricity prices made geothermal development anything but cost-competitive. Geothermal explorers and developers turned their attention to California, Nevada and other areas of the country and the world, where electricity was in short supply and geothermal was a comparative bargain. As a result, the Northwest's geothermal resources remain a technical mystery, and the region is handicapped in its effort to obtain geothermal power.

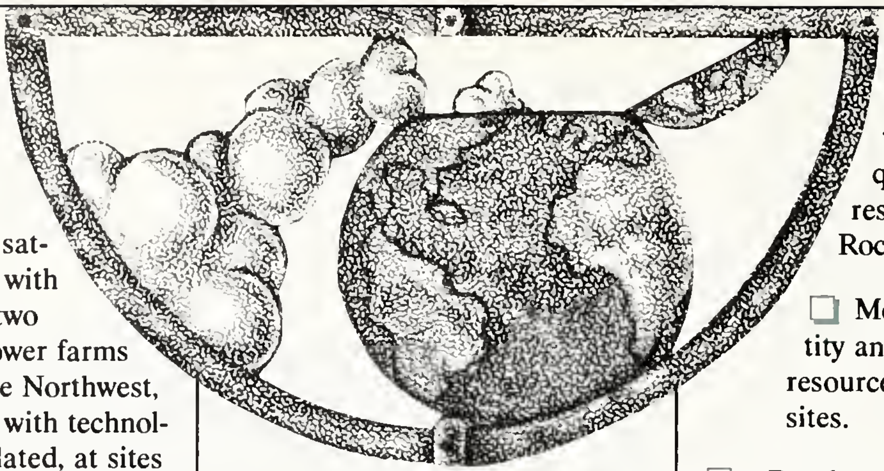
Furthermore, more than most renewable resources, geothermal development poses environmental and land-use conflicts that could hamstring development. This is because many of the most promising geothermal sites are located near national parks, wilderness areas and other important natural landmarks.

Despite these problems, the Council estimates that 350 average megawatts of geothermal energy could be available for development in the Northwest over the next 20 years at costs of 6 to 10 cents per kilowatt-hour. Commercial plants could be in service as early as 1997. Much more additional energy—perhaps several thousand average megawatts—might be available from unconfirmed sources.

To demonstrate whether geothermal can become a viable resource in the Northwest, the Research, Demonstration and Development Committee put together a four–part agenda:

- ☐ Create and maintain a data base containing geothermal resource and power plant data for active North American sites.
- ☐ Before development begins in the Northwest, assemble information on existing environmental conditions at promising geothermal resource areas. This would provide more reliable estimates of the environmental impacts of geothermal power plants, facilitate the study of possible cumulative impacts from several plants in the same area, and shorten the lead time for building plants.
- ☐ Work with state and local governments, geothermal developers, environmental organizations and others to reduce the potential for land–use and environmental conflicts. This might be done through comprehensive land–use plans, zoning, site development standards and state siting council regulations.
- ☐ Finally, develop a demonstration program to confirm the resource at several promising areas. These demonstration projects would have several benefits including confirming that the resource can be developed, providing an opportunity to refine geothermal technology for Northwest conditions, identifying needed environmental controls specific to the Northwest, confirming whether more of the resource is available for development and shortening the lead time to develop those additional resources.





Wind

While wind farms are common in California, the Northwest has little satisfactory experience with this resource. Only two commercial wind power farms were ever built in the Northwest, but these were built with technology that is now outdated, at sites with poorly understood wind conditions. Only one of these wind farms continues to operate. A few residential-scale turbines have been installed at sites with sufficient wind. The few larger units that were experimented with in the region were prototypes, not commercially proven units.

In California, the high cost of other sources of energy, favorable tax incentives and extensive studies of the actual wind characteristics in the state provided a basis for the rapid development of wind power. Wind now supplies about 1 percent of that state's electricity.

Something like that level of development could come to the Northwest. The Council estimates that there is a good possibility that 400 average megawatts of wind energy could be available for development at costs ranging from 8 to 11 cents per kilowatt-hour.

In addition, the potential exists for much more wind power, particularly along the eastern front of the Rocky Mountains in Montana. But development of these resources will require settling questions about the cold-climate operation of wind turbines (something not experienced at California's wind farms) and additional transmission capacity between eastern Montana and the region's western population centers.

While wind farms are common in California, the Northwest has little satisfactory experience with this resource.

The agenda the research committee is recommending for wind is in many ways similar to that recommended for geothermal—collect data and sponsor a demonstration project. While it was not completed as this story went to press, the wind confirmation agenda's basic elements are likely to be:

☐ Assess the feasibility of developing promising Northwest wind resource areas, including assessing long-distance transmission requirements for the resources of the Rocky Mountain area.

☐ Measure the quantity and quality of wind resources at selected sites.

☐ Resolve major uncertainties and risks to development at selected wind resource areas.

☐ Develop a pilot project to resolve technical uncertainties regarding wind machine operation at cold Northwest sites.

☐ Monitor the long-term (over several years) variation in regional wind resources.

☐ Develop a commercial-scale wind farm at a representative Northwest site to demonstrate the cost and performance of wind farms under Northwest conditions, and to shorten development lead time for subsequent projects at that site.

Solar

Solar resources are divided into two broad categories of technologies—solar thermal energy systems and photovoltaics. Solar thermal systems are similar to conventional steam-electric generating plants in that they convert heat into electricity via a turbine generator. Photovoltaics convert the sun's energy to electricity without moving parts by using the electrical properties of the semiconductor materials used in the construction of photovoltaic cells.

Both of these are proven technologies and are used currently in a variety of ways throughout the world.

Jeff King, the Council's senior resource analyst, reports that "solar's costs are continuing to decrease, and the performance of the technologies is improving. In fact, the developer of one design, the parabolic trough with natural gas backup, reports it to have costs of 7 to 8 cents per kilowatt-hour. If this is accurate, it could be competitive with coal-fired power plants. But these estimates are based on a California site, and costs would be somewhat higher in the Northwest."

At the right costs, solar could be used in this region. For example:

- ☐ A solar resource could be combined with a natural gas resource. The gas would back up the solar when the sun didn't shine.
- ☐ Because dry years are often sunny years, the combination of solar and natural gas could replace some of the hydropower lost in drought years.
- ☐ A stand-alone solar resource could be used as a "must-run" resource. That is, all solar energy that's produced would be used. Output from other stand-alone resources could be used to fill in when solar is not available.
- ☐ For applications such as irrigation pumps, where energy use peaks in the summer and transmission lines are scarce, solar plants could provide electricity without new transmission lines.

At the right costs, solar could be used in this region.

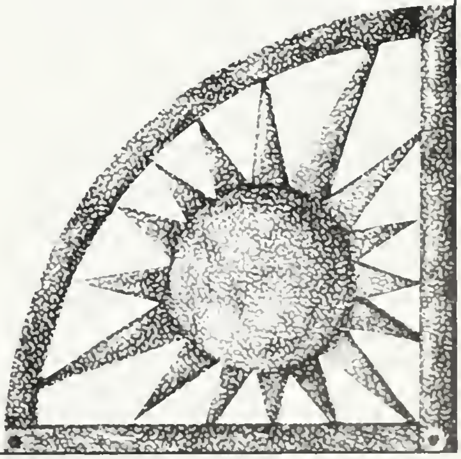
- ☐ Photovoltaics also could be used in remote applications to avoid running transmission and distribution lines to relatively small loads.

The research committee produced the following list of actions to help develop the solar resource in the Northwest:

- ☐ Collect improved solar insolation data[1] for the Pacific Northwest. This data is extremely important to predict solar's contribution to the region's electrical system and to plan for appropriate resources to complement solar.
- ☐ Have the Northwest participate in "PV-USA—Photovoltaics-Utility Scale Applications," an ongoing project, sponsored by several utilities including California's Pacific Gas and Electric, the U.S. Department of Energy and the Electric Power Research Institute (a utility research organization), which monitors the development of photovoltaic technology and constructs small-scale demonstration projects.
- ☐ Assess the opportunities for applying solar photovoltaic systems in the Northwest and the constraints that may inhibit these applications.
- ☐ If necessary, undertake follow-up activities to resolve region-specific constraints to promising photovoltaic applications. These might include specialized demonstration projects and building code and zoning amendments.

The bottom line

The committee estimates that the costs of the proposed wind and geothermal confirmation agendas during the years prior to the demonstration project actually coming into service are in the range of $500,000 to $1 million dollars each year.



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[1] Insolation is the rate of solar energy falling on the earth's surface.

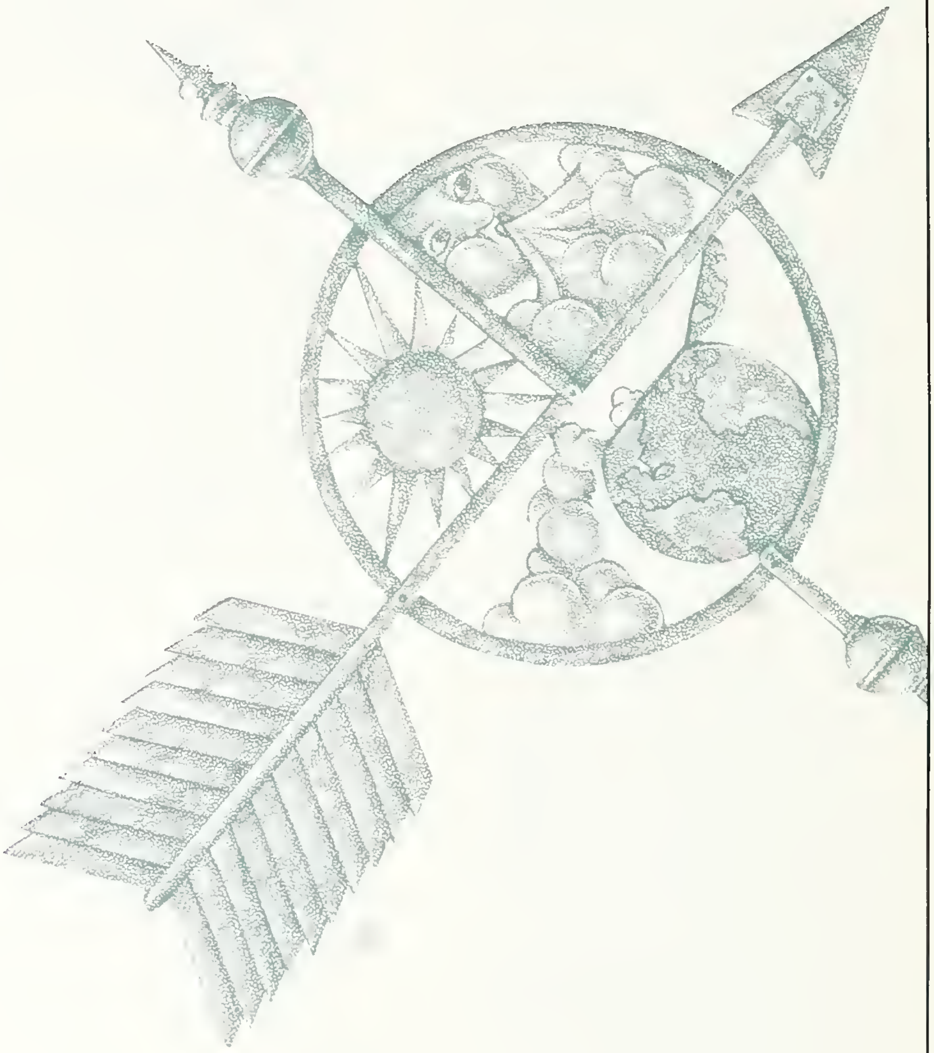
The Council is looking at ways to spread these costs out among those who will benefit from the resources. Most of the actions should have regionwide benefits, and the Council and its advisory committee believe that the costs should be spread as equitably as possible among the region's ratepayers. In the past, Bonneville has been looked to as the source of funding for this type of project, but it is clear that over the next 20 years, Bonneville will not be the sole entity acquiring new electrical resources. One promising approach to spreading the costs is that these actions be sponsored jointly by several utilities and Bonneville.

Bonneville has proposed a partnership or joint contract approach for the geothermal demonstration program. In this case, Bonneville or another utility would take the lead, contracting with other utilities for support of specific activities.

Sue Hickey, assistant administrator for energy resources at Bonneville, spoke for many who commented on the proposed confirmation agendas when she told the Council, "The approach taken by the geothermal confirmation agenda—of voluntary collaboration by regional utilities—should be encouraged as a model for these kinds of activities. The confirmation agenda should encourage utilities to collaborate on resource projects of specific interest to themselves while also benefitting the region. This limits the project management to a focused group of participants who are providing the resources for the project."

K.C. Golden, executive director of the Northwest Conservation Act Coalition, stressed in his comments the importance of the complete renewable resource agenda to the Council. "The proposed agenda may well prove to be the single most important action item in the 1990 plan," he reasoned. "Because these actions may be preconditions to acquisition of some of our highest priority resources, they are every bit as critical as more direct resource acquisition strategies. ...Absent the Council's leadership in this effort, we are apt to fall back on what we know best but want least. An aggressive confirmation agenda is our best hope of never getting into that situation."

Debate on this issue will undoubtedly continue throughout the development of the new power plan. The research committee's final recommendations on this issue and on the agendas for these resources will be included in the draft plan. Debate will continue after that, until the Council makes its final decisions later this year. ■



STUDENT ENERGY SAVERS

by Jim Erickson
Washington State Energy Office

Washington's State Energy Office works with architecture classes to build efficiency for the future.

Commercial structures can be designed to use 30-percent less electricity for heating, cooling, lighting and other operations than most current building practices call for. In areas such as the Northwest's Puget Sound, where the commercial sector is growing rapidly, energy-conscious design and construction can make a tremendous impact not only on the energy bills of the resident businesses, but also on the total energy needs of the area.

But it takes efficiency-minded designers, architects and engineers to dream up those energy-lean edifices. And it takes energy education to make good students into good designers, architects and engineers.

The Washington State Energy Office has taken that concept to heart by concentrating on getting the best energy conservation training for the state's architecture, design and engineering students. Consider it an investment in the future.

David Scott, a Washington State University architecture professor and earth shelter advocate who has been preaching energy awareness in design for the past 20 years, says his objective is to produce graduates who have the savvy and discipline to routinely perform comprehensive energy analysis on the structures they design. He maintains that having architects and engineers who incorporate energy efficiency into their projects pays dividends for society as a whole. "Being able to look at energy options at the conceptual level produces more energy-efficient buildings. And that's good for the public, because you get better design for less money," says Scott.

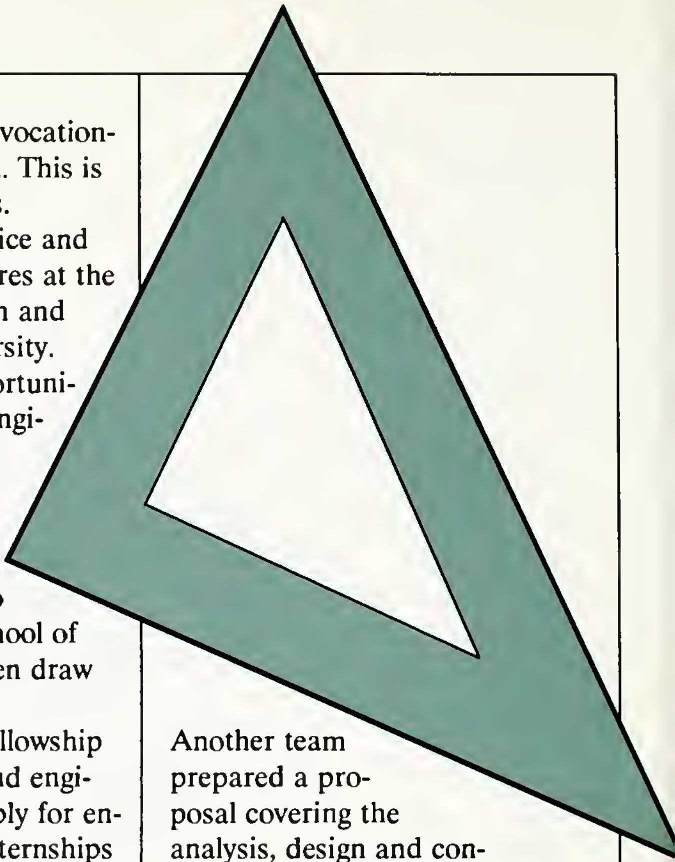
"We've seen what can happen when buildings are designed and built right," explains Tony Usibelli, head of the State Energy Office's commercial and industrial energy section. He cites the Northwest's Energy Edge and Design Assistance programs sponsored by the Bonneville Power Administration as two demonstration programs. "Buildings in the Energy Edge program were designed to use 30 percent less electricity than ones that would have been built without Energy Edge features."

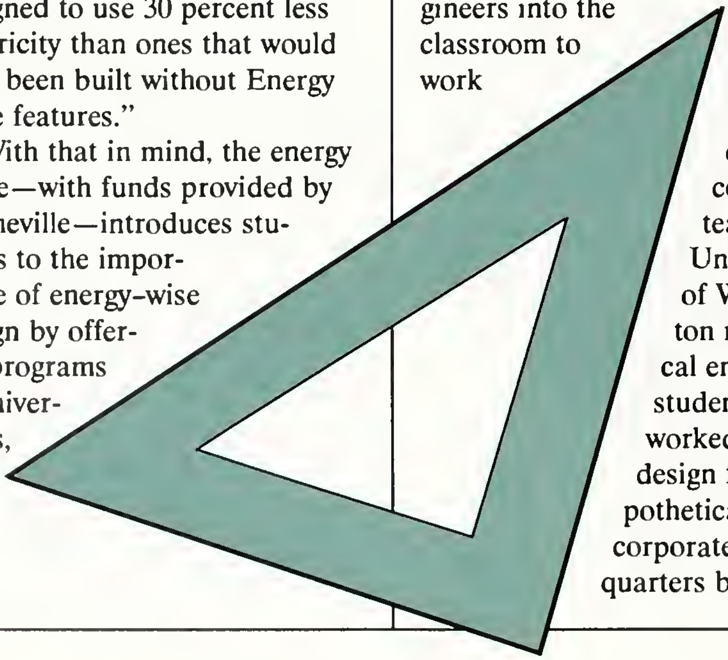
With that in mind, the energy office—with funds provided by Bonneville—introduces students to the importance of energy-wise design by offering programs at universities, community colleges and vocational schools in Washington. This is done in a variety of ways.

The State Energy Office and Bonneville sponsor lectures at the University of Washington and Washington State University. The lectures are an opportunity for architecture and engineering students to hear nationally renowned authorities, such as William Lam, a lighting designer and author who teaches at Harvard's School of Design. The lectures often draw 100 to 200 students.

Through an energy fellowship program, architecture and engineering students can apply for energy office-sponsored internships with commercial design firms. The internships provide students with a chance to put to the test in the "real" world what they've learned. They obtain field experience and gain insights into energy-saving design strategies.

Through mechanical design projects in the classroom, seniors can employ their know-how to the realistic needs of a business. The energy office has helped bring practicing, professional engineers into the classroom to work with students. Recently, one team of University of Washington mechanical engineering students worked on the design for a hypothetical new corporate headquarters building. Another team prepared a proposal covering the analysis, design and construction of a heating, ventilating and air-conditioning (HVAC) system for a hypothetical bank.





For approximately two years now, students at the University of Washington and Washington State University also have used computers purchased with Washington State Energy Office funds to do energy analysis in building design simulation.

"We've got nine work stations," Washington State University's David Scott explains. "The software allows students to do energy analysis. I'd like to have 25 more, because then every student would have access to software. My goal is to get them to do energy analysis without anyone telling them to do it."

In other words, he wants it to become second nature. But he also would like more faculty members to think about energy conservation in their design curriculums.

"I'd say about one-third of the 22 faculty members are tuned in to this way of thinking," acknowledged Scott. “What we’re going to have to do is partially re-educate faculty, introducing them to the capabilities so they feel that energy is an important element in design.”

Still, the students are really the key, as Scott noted. “Once a student knows how to run computer algorithms, regardless of what a faculty member values, students who believe in energy [conservation] always carry their values with them.”

Normally, Scott conceded, the rule of thumb is it takes five to 10 years out of school for students to have an impact on society. He doesn’t think it has to be that way. “With proper training that includes computer modeling, there’s no reason they shouldn’t start having an impact a month out of school,” he asserted. “That’s what I’d like to see.”

Creighton Depew, a University of Washington engineering professor, would like to see that, too. He is grateful to have a professional engineer, Keith Elder, visit the classroom to provide insights into energy and energy codes, because he (Depew) isn’t as knowledgeable in that area.

“This is important information for students who, in a few years, are going to be the designers and implementors,” said Depew.

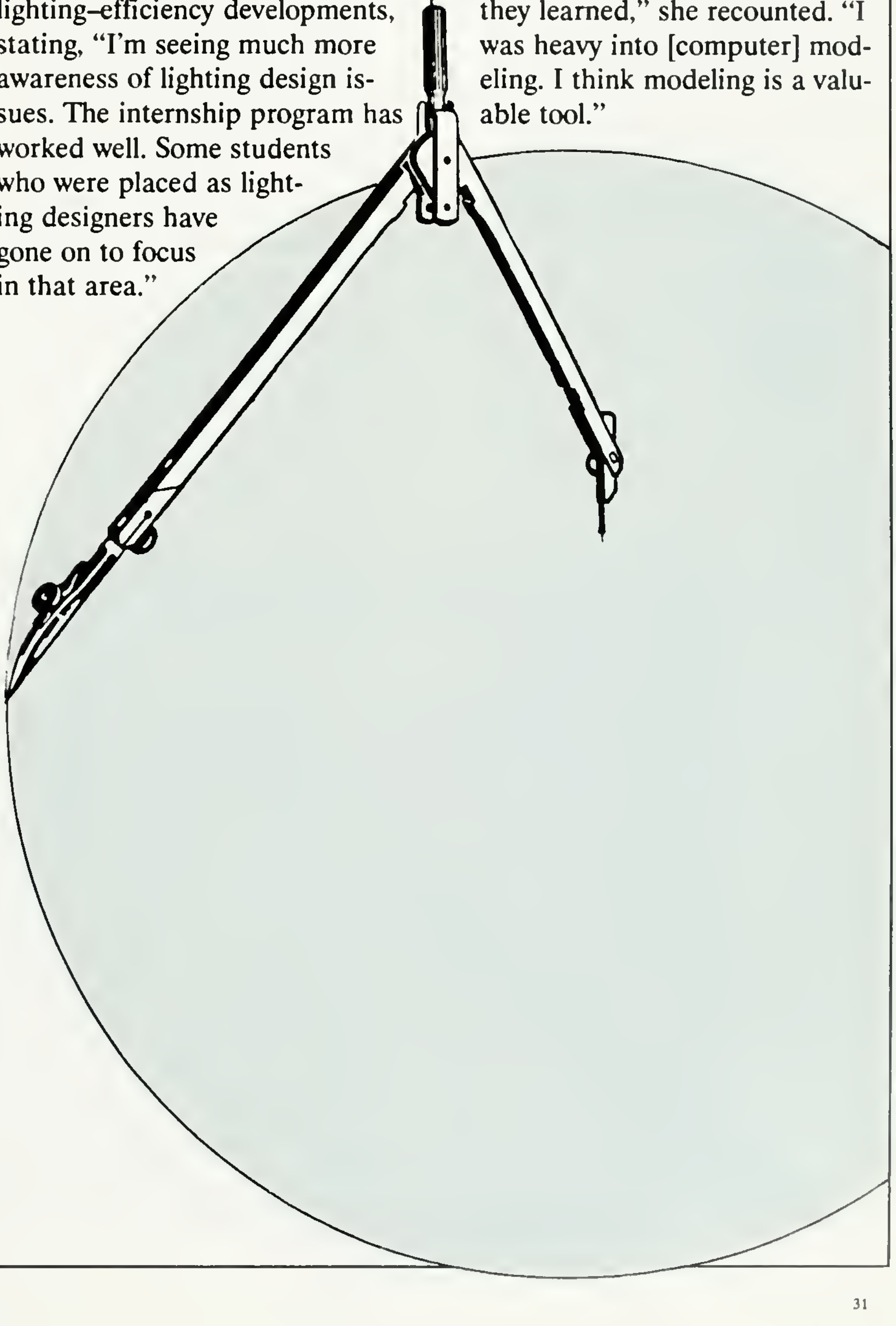
One associate professor who has shed a lot of light, both literally and figuratively, on architectural design is the University of Washington’s Marietta Millet. She helped create the Lighting Design Lab in Seattle, a Pacific Northwest regional facility set up to help designers, architects and commercial building developers incorporate efficient lighting into their structures. It is operated by Seattle City Light, and is sponsored by a variety of agencies, including the Northwest Power Planning Council, the Natural Resources Defense Council, Bonneville and the Washington Energy Office.

The lab features state-of-the-art lighting for office and other commercial uses, along with a variety of new lighting controls. Mock-up, computer modeling and daylighting areas may be set up.

Millet is encouraged by the lighting-efficiency developments, stating, “I’m seeing much more awareness of lighting design issues. The internship program has worked well. Some students who were placed as lighting designers have gone on to focus in that area.”

One student who has “seen the light” and will be employing her knowledge in her work as well as teaching it to others is Mary Guzowski, a University of Washington graduate. Guzowski, who plans to teach at the University of Wisconsin in Milwaukee next fall, said she “got the full picture” during her architectural courses at the University of Washington, including classes in lighting and energy-use calculation.

“There were a lot of opportunities for students to apply what they learned,” she recounted. “I was heavy into [computer] modeling. I think modeling is a valuable tool.”



She served an internship through the State Energy Office program, and had the good fortune to work on lighting design, energy calculations and, of course, the usual architectural drafting.

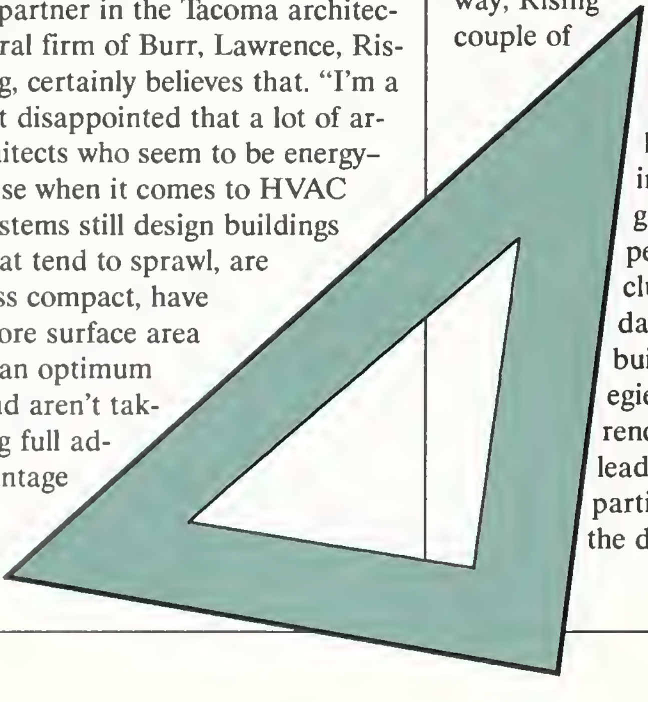
While efficient lighting is her personal bent (she has set up her own lighting studio in her home), she recognizes that there's more to design than just lighting.

"Energy conservation is much deeper," Guzowski related. "It's how you select buildings, the size of openings, the actual design of the building, the relationship of landscape, whether a building is 'dense' or 'linear,' and so much more." She expressed excitement about teaching, noting, "I'll be passing on energy-design knowledge to other students. I feel good about that."

While efforts are being made to educate prospective architects and engineers, there appears to be more that could be done among those already immersed in their chosen careers.

Paul Rising, a 1974 Washington State University graduate and a partner in the Tacoma architectural firm of Burr, Lawrence, Rising, certainly believes that. "I'm a bit disappointed that a lot of architects who seem to be energy-wise when it comes to HVAC systems still design buildings that tend to sprawl, are less compact, have more surface area than optimum and aren't taking full advantage of daylighting as a resource," said Rising.

> "Students who believe in energy conservation always carry their values with them."



Rising is hopeful that things will change, however. The Washington State Energy Office is doing its part to push that along, with help from such professional associations as ASHRAE, the Illuminating Engineering Society and the American Institute of Architects. Together they are sponsoring professional development seminars for practicing architects, HVAC engineers and lighting designers. The training covers new approaches in commercial design, as well as retrofit strategies for business space.

Trying to help out in his own way, Rising has taught a couple of classes at his alma mater. Furthermore, his firm has had summer interns who have gotten hands-on experience, which included working on daylighting and building design strategies. Burr, Lawrence, Rising is on the leading edge, gaining particular expertise in the design of energy-efficient educational facilities. The firm won a national award for its design of Ocosta Junior and Senior High School in Westport, Washington.

"Energy has to be an integrated element in any design," he observed. "Let's not beat it to death, but energy has to serve a function."

Moreover, he and others believe it is worthwhile to educate future architects and engineers so they will be more versed in the values of well-designed, energy-efficient buildings.

SHORTS

The Bonneville Power Administration plans to clean its electrical equipment in western Oregon and western Washington with biodegradable cleaners made from citrus and mint plants rather than with toxic solvents.

The federal power agency in the Northwest will test new environmentally safe cleaners at 143 power substations in the two states. Electrical equipment runs best when it is clean, and for years chlorinated solvents—some of which contaminate groundwater supplies or have been linked to cancer in laboratory tests—have been the preferred cleaners at Bonneville and utilities. Successful tests may prompt Bonneville to use the new solvents throughout the region, the agency said. [Source: Bonneville Power Administration, News Release, 4/17/90.]

The Asian drift–net harvest of salmon and steelhead native to the United States and the Soviet Union would end under a proposed international agreement the two countries signed this spring.

The proposed agreement calls for a halt to the "irrational and wasteful" catch of Pacific salmon and steelhead on the high seas by fishing fleets. Fishing boats from Japan, Taiwan and South Korea—using huge monofilament drift nets 30 feet deep and miles long to catch squid on the high seas—have long been accused of decimating salmon and steelhead populations.

The proposed agreement, which also must be approved by Japan and Canada, would be the first step toward protecting ocean–migrating fish that spawn in each country. [Source: *The* (Portland) *Oregonian*, 3/25/90.]

The Bonneville Power Administration has set up toll–free hotlines to inform building professionals about new energy–efficient products and technologies.

The hotlines, run for Bonneville by the Washington State Energy Office, will give utilities, architects, designers and engineers access to up–to–date information about products and technological breakthroughs, as well as access to technical experts. The service can be reached at 1–800–872–3568; computer users can tap into the service's electronic billboard via modem at 1–800–762–3319. [Source: (Bonneville Power Administration) *Journal*, 4/90.]

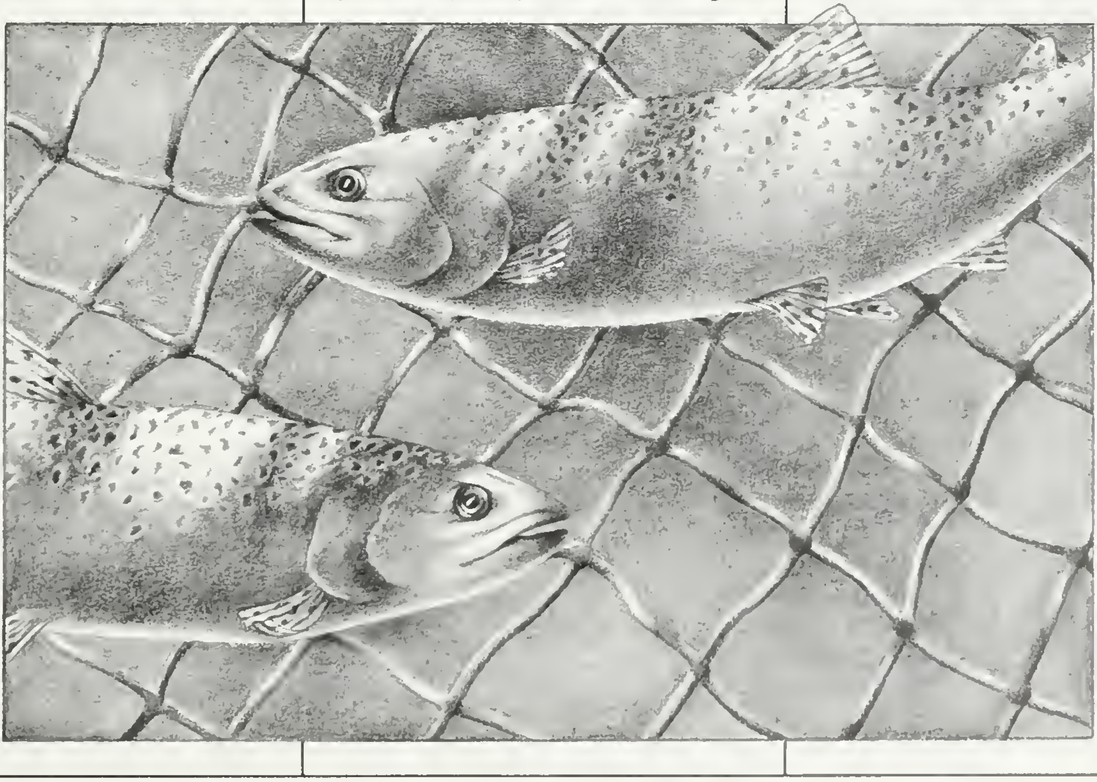


Illustration by Joan Barbour

SHORTS

Billionaire industrialist J.R. Simplot plans to install cogeneration facilities at up to 20 of his company's Idaho facilities. The head of the Idaho company bearing his name says that the first equipment will go into Simplot's food processing plant in Caldwell within the next five years. Depending on power demand, it will produce as much as 100 megawatts of electricity using waste heat produced from gas turbines that provide steam for food processing. [Source: *The* (Boise) *Idaho Statesman*, 4/3/90.]

The Bonneville Power Administration and Oregon State University opened the region's newest fish–disease laboratory in April.

The 9,300–square–foot facility on the Willamette River in Corvallis will study how to detect, prevent and control diseases that infect wild and hatchery–bred salmon in the Columbia River Basin. [Source: (Bonneville Power Administration) *Journal*, 4/90.]

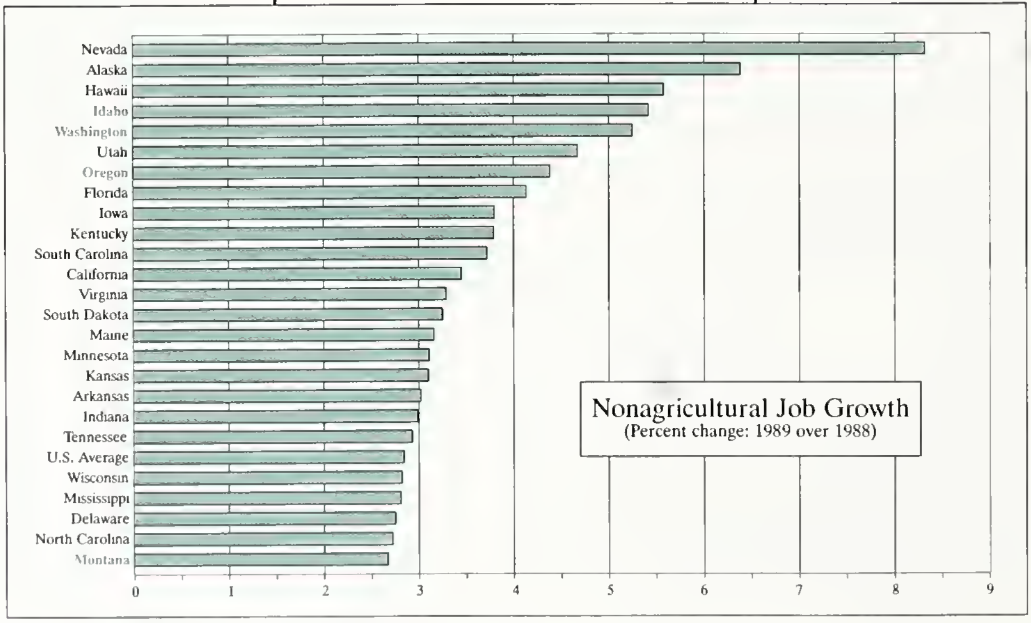
Indian tribes in Washington will jointly manage with the federal government public lands behind Grand Coulee Dam.

Under an agreement negotiated this spring, the Colville Confederated Tribes and the Spokane Tribe will become full partners with the U.S. Bureau of Reclamation, the National Park Service and the Bureau of Indian Affairs in managing land behind the central Washington hydropower dam.

This is one of the first times that tribes will help manage non–Indian public lands. In the past, the Park Service oversaw non–Indian reservation land along 151–mile–long Lake Roosevelt behind the dam, while the tribes managed the reservation property. [Source: *Tri–City Herald* (Pasco, Washington), 4/15/90.]

The West leads the nation in new job creation, according to a panel of western economists surveying U.S. Bureau of Labor Statistics. Nevada is well out ahead of the nation with 8.32–percent growth. Idaho, Washington and Oregon are in the top seven states, with non–agricultural jobs increasing at 5.42 percent last year in Idaho, 5.25 percent in Washington and 4.38 percent in Oregon. Montana, with only 2.67–percent job growth, still lags behind the region, falling in the twenty–fifth slot. Nonetheless, even Montana is only slightly behind the national average of 2.84 percent. [Source: *Western Blue Chip Economic Forecast*, Volume 4, Number 4, 4/90.]

—Compiled by Gordon Lee



Nonagricultural Job Growth
(Percent change: 1989 over 1988)

Chart by Stephen Sasser and Judy Gibson

Source: U.S. Bureau of Labor Statistics

CALENDAR

July 11–12—Northwest Power Planning Council meeting at the Outlaw Inn in Kalispell, Montana.

July 23–27—"Goodwill Games: Energy Conference" at the Stouffer-Madison Hotel, 515 Madison Street, Seattle, Washington. U.S. and Soviet Union energy experts meet to discuss energy conservation and least-cost planning. For more information: Judi Hertz, Northwest Power Planning Council, at the numbers listed below.

July 29–August 3—"Indoor Air '90: The Fifth International Conference on Indoor Air Quality and Climate" in Toronto, Canada. Sponsored by the Building Owners and Managers Association International, the Center for Indoor Air Research, U.S. Department of Energy and others. For more information: Indoor Air '90, c/o Canada Mortgage and Housing Corporation, 682 Montreal Road, Ottawa, Ontario, Canada K1A 0P7, 613–748–2714 or 748–2715.

August 8–9—Northwest Power Planning Council meeting in Oregon.

August 19–23—"World Congress of the International Solar Energy Society," in Denver, Colorado. For more information: American Solar Energy Society, 2400 Central Avenue, Suite B1, Boulder, Colorado 80301, 303–443–3130.

August 20–24—1990 International Symposium on Geothermal Energy in Kailua Kona, Hawaii. For more information: Geothermal Resources Council, P.O. Box 1350, Davis, California 95617–1350, 916–758–2360.

August 26–September 1—"1990 Summer Study on Energy Efficiency in Buildings" at the Asilomar Conference Center in Pacific Grove, California. Sponsored by the American Council for an Energy-Efficient Economy. For more information: Lawrence Berkeley Laboratory, ACEEE 1990 Summer Study Office, Building 90H, Berkeley, California 94720, 415–486–7478.

September 12–13—Northwest Power Planning Council meeting at Templin's Hotel in Post Falls, Idaho.

October 10–11—Northwest Power Planning Council meeting at the Tacoma Sheraton Hotel in Tacoma, Washington.

October 30–31—"Visions for a New Decade: Northwest Energy Expo '90" at the Tacoma Dome Convention Center, Tacoma, Washington. Sponsored by Seattle City Light, Tacoma City Light, Puget Sound Power and Light, Snohomish County Public Utility District and the Bonneville Power Administration. For more information: Will Lutgen, TLA Marketing, 10020A Main Street, Mail Stop 443, Bellevue, Washington 98004, 206–455–9917.

A more detailed calendar of Council committee meetings and consultations is carried each month in *Update!* See order form on back cover.

—Compiled by Ruth L. Curtis

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- ☐ 1986 Northwest Power Plan
- ☐ 89-1 1989 Supplement to the 1986 Northwest Power Plan
- ☐ 1987 Columbia River Basin Fish and Wildlife Program
- ☐ 1990 Directory of Organizations
- ☐ 90-9 Yakima Production Project: Review of Preliminary Design Report
- ☐ 90-11 Draft Tenth Annual Report of the Northwest Power Planning Council

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- ☐ *Northwest Energy News* (this bimonthly magazine)
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